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AMERICAN GAS JOURNAL

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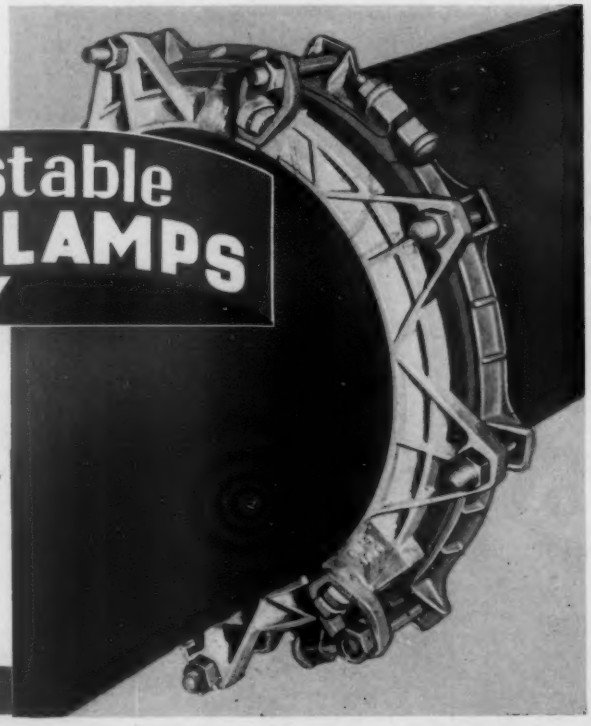

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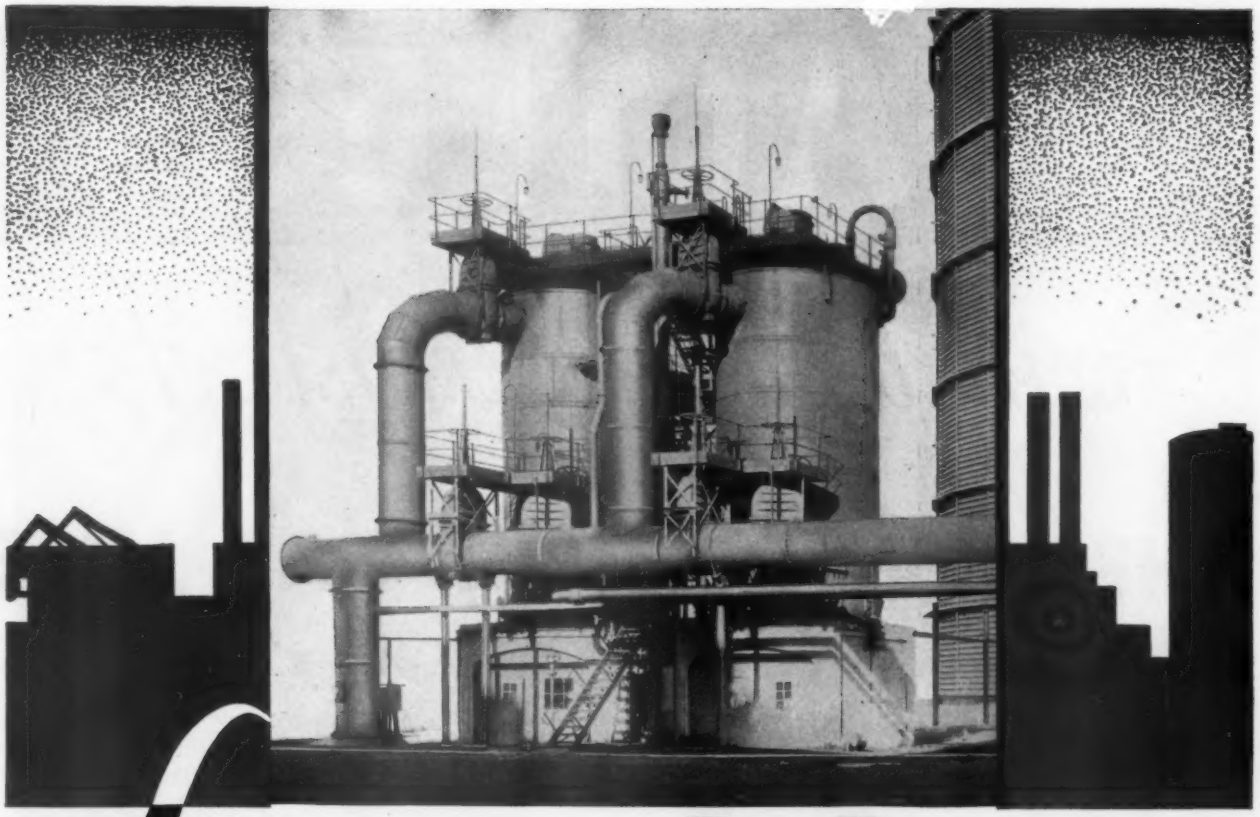

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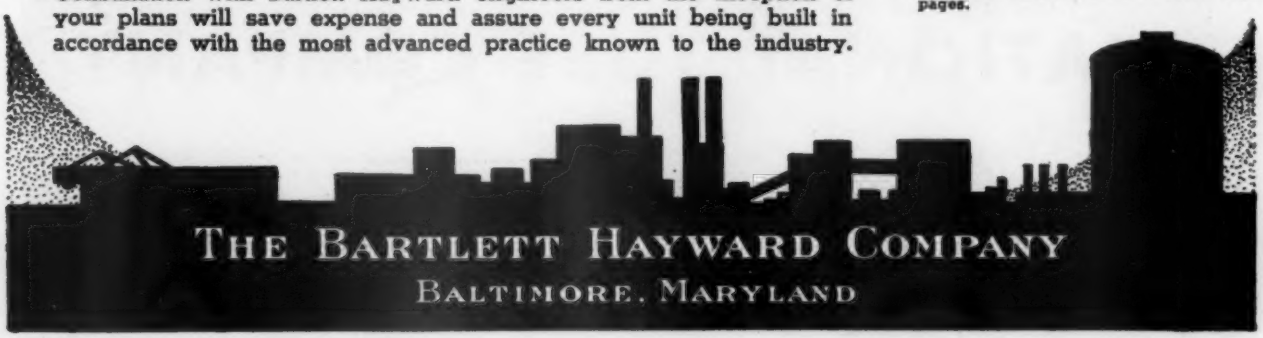

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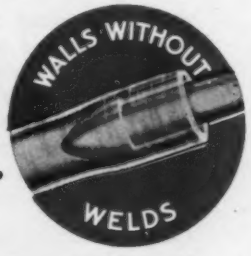

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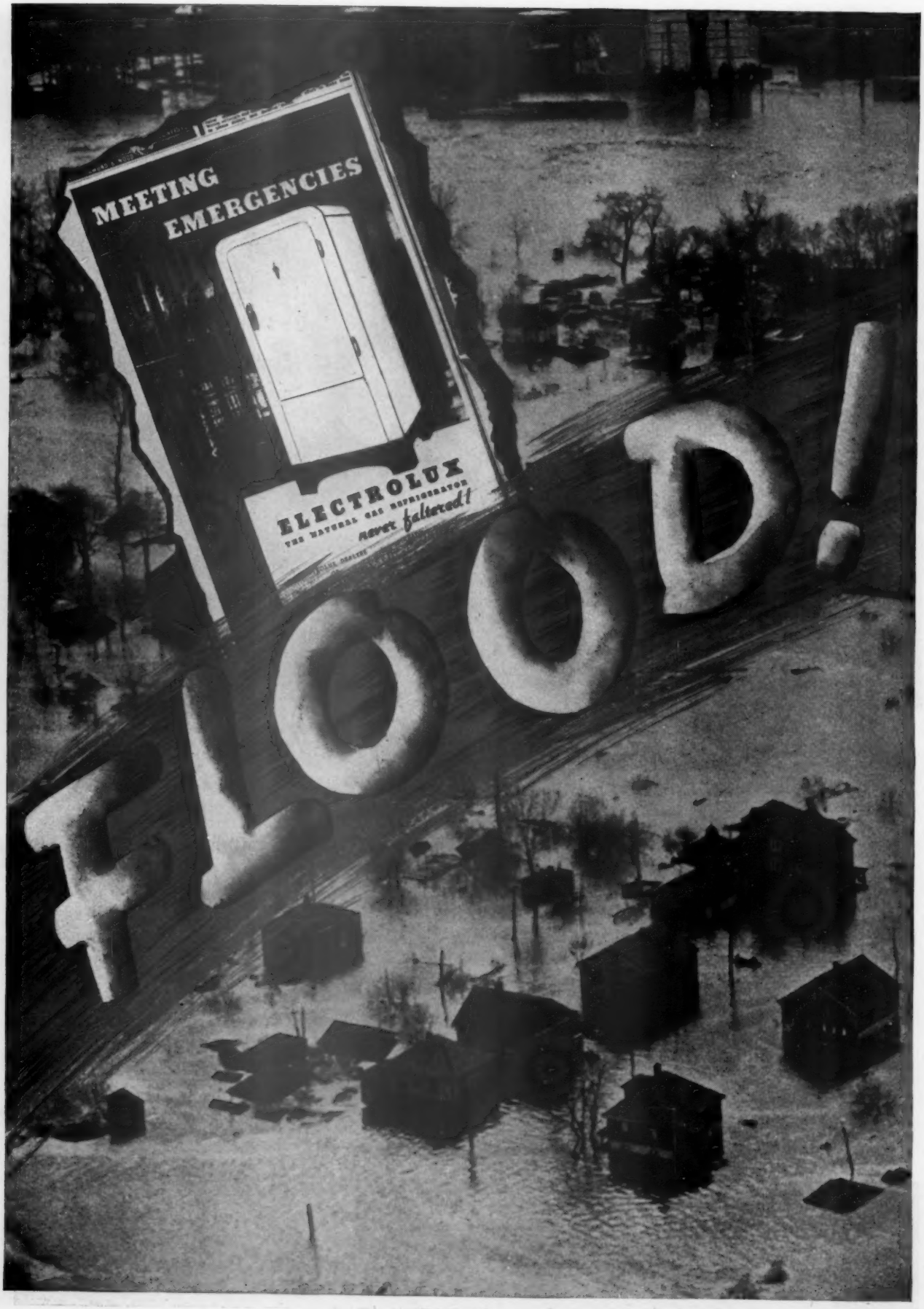
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NUMBER 5

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Contents

A Ground Aeration Device—G. Edward Hitz 13

Domestic Gas Utilization—Range Division—Ovens—Chas. W. Merriam, Jr. 15

Lubricated Plug Valves—Allen D. MacLean 18

Gum Forming Hydrocarbons—W. Grant Annable 21

Chapmanizing 23

Observations on Meter Practices—W. F. Henderson 25

Galvanized Tank Corrosion on Automatic Water Heaters—Part II—A. F. Craver 27

As the Editor Sees It 29
(The Flood of 1936)

Use of Copper Pipe for Gas Services Drips, Etc.—H. L. Gaidry 30

Developments In Rental Purchase Plan In Rockford, Ill.—H. S. Oyen 33

Effective Methods of Handling Test and Trial Installations—F. B. Jones 35

Infant Copy . . . For Effective Window Display—Stuart Bratesman 38

Demonstrations by Six Year Old Prove Simplicity of Modern Gas Range—Lucius S. Flint 39

Over 32,000 Came—Guessed and Went Away Talking Gas Refrigeration—Howard C. Minnich 42

News of the Gas Industry 44

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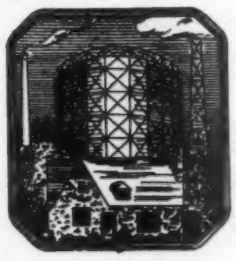

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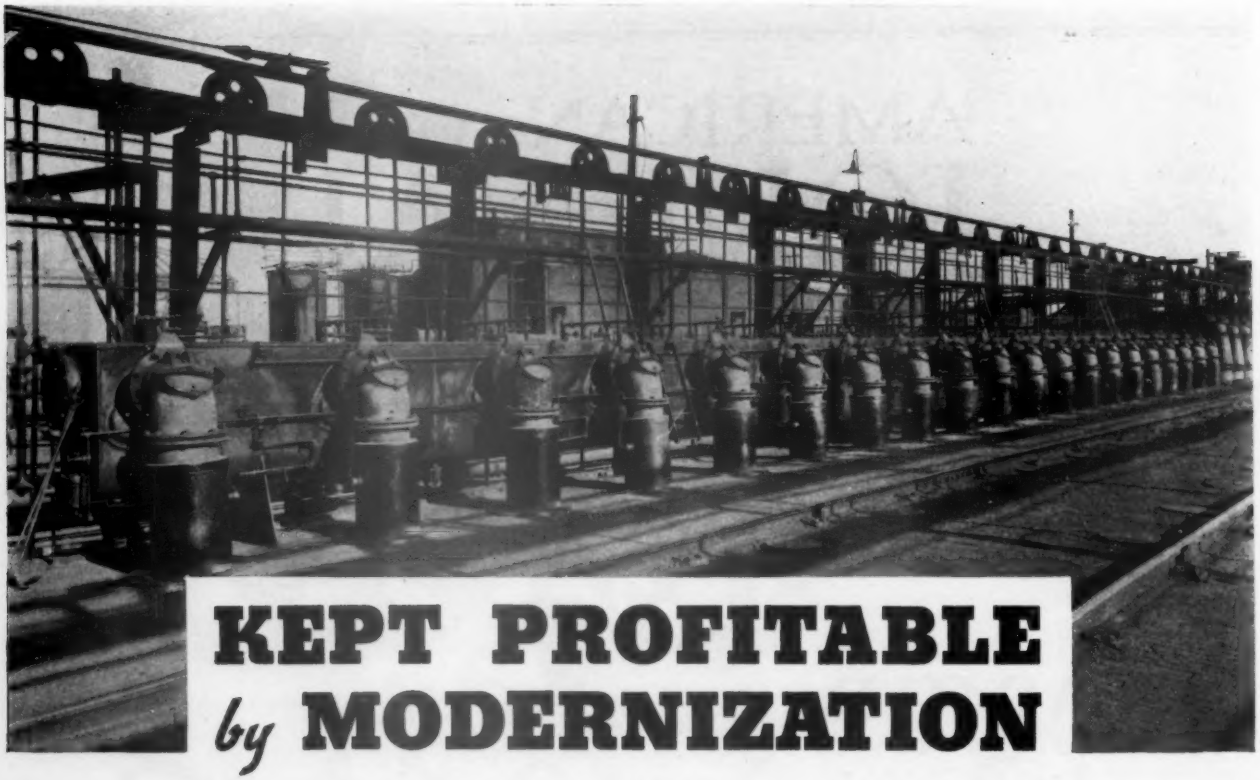

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MAY
1936

AMERICAN GAS JOURNAL

VOLUME 144
NO. 5

A Ground Aeration Device

By G. Edward Hitz

Supt. Gas Distribution, Central Hudson Gas & Elec. Corporation
Poughkeepsie, N. Y.

IN connection with the Paper "Experience in Leak Proofing Bell and Spigot Joints" recently presented at the American Gas Association Distribution Conference, at Memphis, Tenn., mention was made of a ground aeration device.*

Since the preparation of this paper, the device has been materially improved in design and as a considerable interest has been shown in the practical use of this tool, the following description may be of interest.

Most soils contain a large percentage of voids which normally are filled with air. Experiments have shown that the volume represented by the voids may be as much as one-third of the earth volume. Gas leaking from the underground system diffuses through these voids and unless a free vent to the surface is afforded, spreads over a considerable area. The removal of this residual gas from the ground is the purpose of the aerator.

The original aerator, as detailed in the writer's paper, had two fixed jets, which made it necessary to have an operating inlet pressure within very close limits to secure maximum efficiency. In experimental work we found that the variations in the results were due to the change in the permeability of the soil, or, as the texture became more or less dense, the vacuum set up by the aerator varied.

We consulted with the Schutte & Koerting Company and they recommended a unit with an adjustable throat orifice. The use of this design permits operating with full compressor pressure, as available, and

G. Edward Hitz

adjustment to the highest vacuum possible in the soil under treatment. A vacuum gauge having a scale range of 0 to 30" Hg. is installed in the suction riser, face up, for control purposes. A vacuum of from 2 to 12" Hg. or more, is possible and the highest efficiency quickly determined by throttling the regulating spindle to the conditions presented by any particular soil.

Figure 1 shows a cross-section of the (4E-Fig. 431) ¾" ejector unit. The accompanying photograph shows the simple auxiliary piping completing the device. The suction riser is composed of a piece of ¾ inch pipe about 3½ feet long, from which is extended a piece of ½ inch pipe about 2½ feet long. The vacuum gauge is connected at a convenient point in the ¾ inch leg as high as possible and turned face up to be easily visible to the operator. The ½ inch leg is especially designed to suit the smaller hole diameter resulting from the use of a needle bar in the lower section of the bar hole near the main. The lower end of the ½ inch piece is closed and 6 or more ¼ inch holes are drilled vertically at ½ inch spacings on each quarter of the pipe, beginning about 2 inches from the bottom. The closed end prevents plugging the riser with earth and permits driving the unit easily to the bottom of the bar hole. A ¾ inch rubber wedge plug is used in the bar hole to seal the upper pipe section at the ground line. This is known to the barrel trade as the "B. B. bung."

The aerating device requires about 40 cubic feet of air per minute but we have had no difficulty in operating simultaneously three units from a 5" x 5" air compressor.

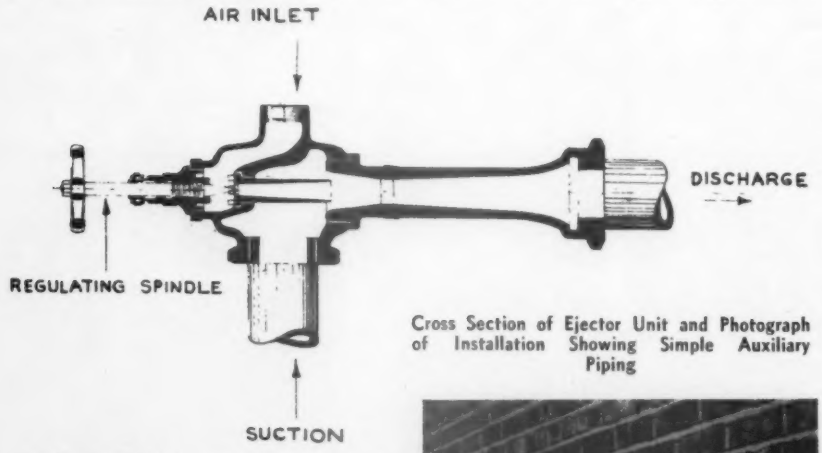
This unit was developed primarily to clear the ground of residual gas following the "Liquid Joint Treating Method." Our experience shows that where gas has been leaking for a considerable period, the ground becomes saturated and will remain so for long periods, even though the leakage source is stopped as a result of the liquid treatment. It is important, therefore, that the residual gas be drawn from the ground, if the measure of the success of the liquid treatment is determined by gas detection instruments, or other means, before and after treatment.

We have found this device very helpful in the problems of gas distribution work and outline a few of the more important uses below:

The possibility of removing residual gas from the ground is taken advantage of in the location of leaks which otherwise would be very difficult to find. This is particularly

* *Paper reprinted in April issue American Gas Journal.*

true in streets which contain many voids or possibly sub-surface structures, such as ducts and manholes. In some instances gas permeates over a wide area with a similar intensity at all points. By using the aerator and clearing the gas from the voids, the source of the leak becomes evident in a very short time and repairs can be effected. After repairs, the remaining residual gas can be drawn from the ground and subsequent difficulty from underground air currents carrying gas into ducts, manholes and cellars is eliminated.



Cross Section of Ejector Unit and Photograph of Installation Showing Simple Auxiliary Piping

Our practice is to locate the center of intensity in a given leak as soon as possible by investigating curb boxes, cracks in curbs, and any other surface source which might show an indication of gas. The first bar hole is put down in the usual manner at the central point and bar holes worked in a bi-lateral direction and the intensity noted in each hole. The aerator is then put to work beginning at the center and working in both directions until a hole or holes are found which will not clear after a reasonable time. Usually the leak is discovered very near the bar hole which does not clear.

Intersection leaks are sometimes difficult to locate, and we have frequently been able to determine the direction of flow by the process of elimination, using the aerator progressively from a central point, say, at the cross or tee centering the intersection. For instance, if it is possible to clear the holes on one of the lateral legs near the center and it is not possible to clear the holes farther up the street, it is evident that the leakage experienced at the intersection is traveling up that leg of main. By using this method progressively on all three or four street main legs, as the case may be, the direction of gas flow may be definitely determined and the leak located.

In one of our districts last winter we had a main break on a street which had considerable rock fill. The break was repaired, but for some time complaints were received from several houses that gas odors were prevalent at certain times. Our street foreman noted that the complaints were tied in with a northwesterly wind, which apparently in some manner set up an underground air current which carried gas into the houses. We put several aerators to work in this short block and it was surprising how much residual gas was drawn from the ground. The complaints ceased and the odor conditions cleared up in the houses.

Another use to which the aerator is adapted is in the treatment of trees affected by gas. We have developed a method which is successful if the trees have not been exposed for too long a period. Several concentric rings of bar holes are driven around the tree and the holes aerated until tests show the ground to be absolutely free of gas. The end of the exhaust nozzle of aerator is capped and a momentary shot of air is projected into each bar hole. This operation has a tendency to create fissures in the earth which extend to the tree roots aiding in the complete aeration of the ground and permitting moisture to easily reach the roots.

We have found the "aerator" of considerable value in the various operations incidental to gas distribution maintenance.

New Main Extension Rule

The Southern California Gas Company has filed a new main extension rule with the California Commission, which is unique in that it gets away from the usual allowance of a definite number of feet of new main per consumer. The principle features of the new rule are as follows:

1. Main extension allowances are based on the appliances to be connected with solid pipe connections within a period of ninety days after the installation date of the main; the original allowances on individual domestic main extensions are three and one-half times the estimated annual billing of the appliances to be connected.

2. In the event the main has been installed at the partial expense of the Company (one or more applicants have put up a deposit in aid of construction) refunds for premises of additional customers served (after the ninety day period) will be one and one-half times the estimated annual billing for the appliances connected with solid pipe connections, for individual domestic main extensions.

3. For Real Estate Subdivision main extensions both the original allowance and refund allowance are two and one-half times the estimated billing of appliances connected with solid pipe connections.

4. "Series Refunds" will be made, under certain conditions, to applicants having the oldest outstanding unexpired deposit on an extension forming one of a "so-called" series of mains, for additional appliances connected to subsequent mains.

Domestic Gas Utilization

Range Division—Part II

Ovens

By

Charles W. Merriam, Jr.

Div. Commercial Manager,
Roanoke Gas Light Co.
Roanoke, Va.

ROMANTICIZED versions of the virtues of various domestic range ovens competitive to gas are so blatantly publicized by partisan interests that retail gas salesmen must of necessity be armed with the facts concerning relative oven performances and characteristics. In day-to-day "door bell pulling" the gas range salesmen must be prepared to intelligently combat the *thin air claims* of competitors, particularly the electric man, who either through ignorance or maliciousness endeavor to mislead an unsophisticated public. Is the oft repeated assertion that electric ovens are "scientifically the most accurate" a clumsy untruth? Is imagination or memory the source for the rapt adulation of the "cookies Mother used to bake down country in the ole' coal range?" Is this chatter about gas ovens robbing meats of beneficial juices and vitamins through absorption in the products of combustion going up the draft vent, a pure myth or a demonstrable fact? These and many other kindred fundamentals need answering. The persistence of the electric ballyhooers in directing public attention to the oven is popularizing "whole meal oven cooking," which for the most part is a defense mechanism to counteract high fuel costs of coil top burners. Modern bakeries and the delicatessen store have tended to decrease the importance of home ovens but the public still regard the baking qualities of a range to be a real mark of value. Well equipped gas salesmen should know ovens "inside and out" to be well girded for argument. Definite and unassailable advantages are possessed by the gas oven whose sales assets have, generally speaking, never been fully capitalized on. Almost needless to say, an intimate knowledge of the oven temperature heat control is likewise worthwhile selling knowledge when properly and aggressively employed.

Oven Types

Acquiring familiarity with ovens starts logically with an examination of the four principal gas types now having common acceptance as illustrated in the accompanying drawings according to the following general classifications:

Type I—The products of combustion and heat from the burned gases progress horizontally from the burner to the base of and hence up the vertical wall flues through the sides of which openings circulation is permitted into the oven itself. Hence, circulation progresses out and up the vent hole in the upper part of the rear wall.

Type II—Progress of circulation is identical with Type I except that a reverse in flow direction takes place in the oven whereby the escape vent for the products of combustion is located near the base of the rear wall (instead at the top).

Type III—In this type a greater portion of the heat is transferred by conduction through the oven bottom into the cooking chamber than is contemplated in the design of either Types I or II. The products of combustion and spent heat are withdrawn in a horizontal flue along the oven top. This is sometimes known as the semi-direct Type.

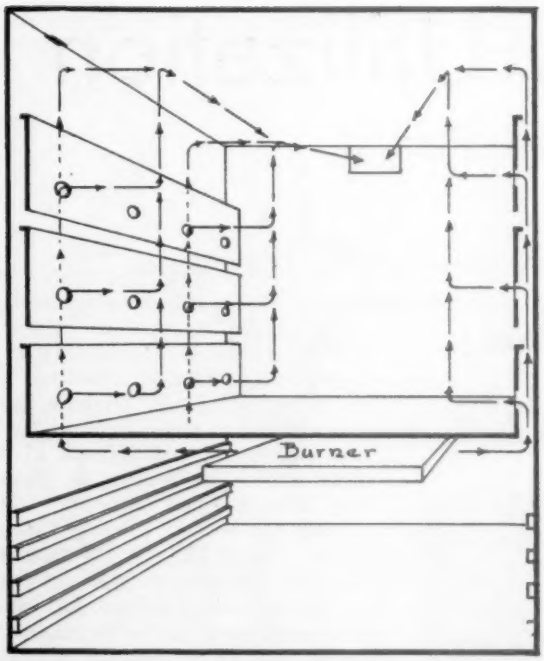
Type IV—Fresh air ventilation implies an arrangement of flues whereby the products of combustion do not enter the oven proper. As shown, fresh air is taken in at the rear of a false oven bottom in which separate chamber the same is heated before passing up through the oven bottom. Heated fresh air ascends through the oven and hence out into a horizontal vent chamber at the top. The products of combustion progress from the gas burner to the base of and hence up the side wall flues to the vent chamber common to that from the inside of the oven.

Observe that in these sketches the burner is represented as being beneath the oven bottom or baffle and in a broiler chamber there are various modifications to the foregoing types but these four represent the basic classes.[1] Observe that in Types I and II the oven bottoms are, by the nature of their purpose, heavily insulated to resist the transfer of heat whereas Types III and IV require only iron sheeting in permitting heat to flow into the oven through the bottom. Due to the fact that in Types III and IV heat can flow into the oven without prior absorption into the walls, it is normal for these two types to be quicker in the heating up or so-called preheating period. On the other hand, Types I and II are reputed to have better temperature continuity due to the wall flues arriving at the thermostat setting before the oven interior. These two points of view are fretted with technicalities that are perhaps beyond the scope of most salesmen, although *much-to-do* is frequently heard in retailing markets of the virtues of each of the four types. Depending upon the manufacturer present at any given moment during such a discussion one can readily receive instruction on the "good" of one type and the "bad" of the others—suffice it to say here that with proper design any one of these four methods will allow the obtaining of reasonably accurate temperature control and good baking results.

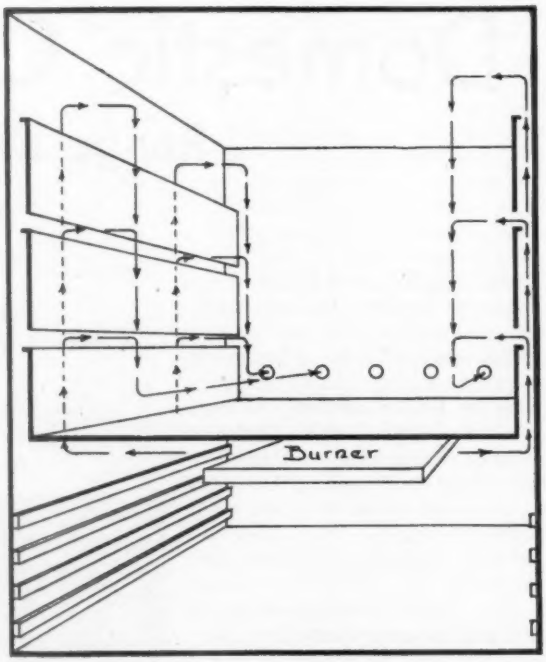
In the gas oven, it will be observed, heat is transferred primarily by the fundamental process of convection, i.e., the circulation of the hot products of combustion and/or heated air through the entire oven chamber. Construction is such (excepting only the "fresh air" type) that due to the vent draft, circulation is virtually forced in such a

---

[1] *The so-called "direct-action" oven in vogue a few years ago is now generally considered as being obsolete. The "dutch-oven" type (no combustion products in oven) has comparatively but a very limited acceptance. In some instances the oven burner does not also act as the broiler burner as in the elevated broiler table-top range in which case the oven burner is housed in a combustion compartment similar in many respects to a broiler except appreciably smaller.*



OVEN TYPE I



OVEN TYPE II

manner that the distribution of heat tends toward equalization of oven temperatures thus making for sound baking qualities.[2]

[2] *Radiant heat is the primary heat transfer principle employed by the electric range oven with the uncovered resistance coil element. Due to the fact that radiant energy travels in waves like sun heat the electric oven of this type by its very nature cannot attain as closely controlled temperatures. When a cooking utensil, such as a biscuit tin, is placed between an open element and another utensil that utensil furthermost removed from the element is, figuratively speaking, in the shade and due to not receiving heat rays directly is perceptibly affected. Likewise, the distance at which an object is placed from a radiant source enormously conditions the heat received (heat intensity varying inversely as the square of the distance), thus a pan placed near the top of an electric oven will be cooler than one placed immediately over an open element. Further than this, radiant heat travels radially from the source (intensity varying as the fourth power of the difference in temperatures) in consequence of which if all articles on one oven rack were to absorb radiant heat uniformly, a spherical shape element would have to be devised.*

Of late electric range manufacturers have sought to remedy these heat distribution difficulties by placing a heavy metal shield over the bottom element thus transforming radiant heat into conducted and convected heat. Unfortunately, however, due to lack of circulation through the oven this heat concentration has tended to foster an unbalanced temperature condition, as well as reducing the oven preheating speed per kwh. input. Nevertheless, by the manual use of the electric broiling element in the top of the oven preheating speeds may approach and sometimes exceed those of certain gas ovens.

Reference is made to the excellent article on the subject entitled, "Baking Characteristics of Gas and Electric Ranges,' by R. M. Conner appearing in the March 1935 issue of American Gas Association Monthly.

Due to greasy film, soot, and odors ovens used in conjunction with oil or kerosene stoves do not allow the products of combustion to come in contact with the oven load. Performances on oil fired ovens are inferior from a temperature distribution standpoint and, of course, are not subject in the domestic field to automatic heat control.

On the coal range the fire box is usually placed to one side of the oven, heat from the fire rises to the under side of the top plate from which by a system of baffles and dampers the products of combustion may be directed across the top of the oven and hence down the side opposite to the fire box, hence underneath the oven and up a rear flue. Other methods of heat circulation are in use but in every case combustion products are supposed not to enter the oven proper. Heat transfer is uneven and, of course, not subject to thermostatic control. A tell-tale recording thermometer placed in a coal range oven with suitable apparatus for ascertaining temperatures at various points reveals why although the experienced, time-worn-with-care mother might get happy results the modern housekeeper with a penchant for accuracy sniffs in disgust. The general baking procedure followed with both oil and coal oven is to heat up to a high temperature and then bake of a "receding heat," i.e., a gradually declining temperature.

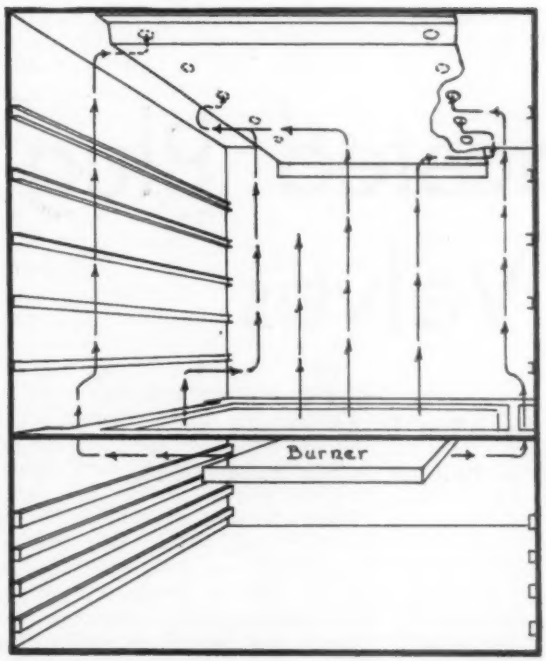
Oven Sizes

A large majority of the gas ranges currently being sold are 16" in width and 14" in height, these dimensions having been found to be most adaptable to the average American home for normal housekeeping purposes. The depth is observed to vary from 18" to 20". Such dimensions provide for two oven slide racks, each of which will accommodate two 9" cake tins.[3] Using only the bottom rack a roaster holding a rib beef up to 15 lbs. may be easily employed. Whole meal cooking methods for even large families may be followed readily with a so-called standard 16" oven.

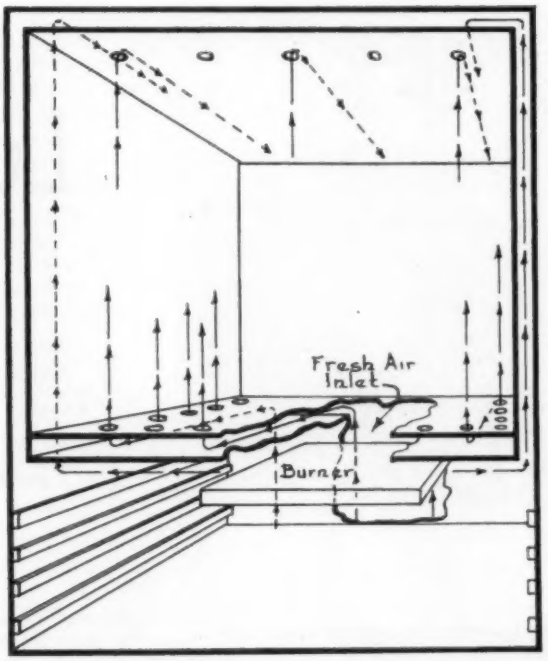
In the single swing door table top the oven height has been cut down to 12" in order not to force the broiler to an inconveniently low level. This type of range, while somewhat cheaper in price, places restrictions on oven cooking capacity. The 17"

[3] *Racks are made in several styles. Minor advantages are claimed for those oven trays having flat or ribbon strips as opposed to those having round or circular rods, the claim being that the flat surface offers a more secure foundation for small food containers (ramekins, etc.) than the round rods. Some racks are happily provided with a rod across the back slightly elevated above the plane of the tray so that dishes, potatoes or such will not fall over the rear when the tray is jerked forward from the oven.*

Not unfounded claims are being currently made for a range whose oven is equipped with an outside lever handle for the purpose of ejecting over racks and their contents, this preventing the necessity of the housewife inserting her hand into hot ovens.



OVEN TYPE III



OVEN TYPE IV

and sometimes the 18″ width ovens are being sold particularly for large families. The wider ovens permit baking in four 10″ pie tins simultaneously. There appears to be a growing disposition of retailers to advance two-oven ranges, i.e., a perhaps 18″ width, large oven and a small 14″ width by 10″ high pastry oven, the theory being that for incidental small operations the oven of lesser size would affect a saving in gas whereas the large oven would be held in reserve for large dinners and "whole meal cookery."[4]

Many astute retailers regularly keep their showroom display ranges equipped with a large size roaster and four cake tins to illustrate oven capacity and utensil arrangement. This approach indubitably lends force to the demonstration—to a woman "seeing is believing."

A definite relationship exists between the size of a gas oven and the required rate of heat input. The accepted standard (for Am. Gas Assoc. approval) is not less than 8,000 Btu. per hr. for each cu. ft. of interior oven space for normal size domestic gas ranges. Illustrating this standard of heat input with an oven of common dimensions (such as, width 16″, depth 18″, and height 14″ having 2.33 cu. ft. of interior space) the maximum rating would be 18,700 Btu. per hr. (35.6 cu. ft. of 525 Btu. gas or 18.7 cu. ft. of 1,000 Btu. gas). This heat input standard is judged by experience to allow ovens to be brought up to the required temperature in a reasonable length of time (from room temperature to 500° F. being the minimal A.G.A. approval specification). The average gas oven will heat up to 500° F. in approximately 17 minutes although some require as little as 12 minutes. Obviously, other things being equal, the larger the oven size the greater is the required heat input.[5]

Oven Cleaning

Modern gas ovens are porcelain enamel lined throughout which in addition to preventing corrosion from moisture facilitates the ease of cleaning. The process of cleaning ordinarily involves the use of only a damp cloth but for particularly bad spill-overs a blunt scraping instrument, such as the back of a knife, plus some warm water, soap and a modicum of vigor will suffice. On particularly tenacious accumulations water and soda, or a rag dampened with benzene or kerosene, or some non-gritty commercial preparations, such as Bab-o, will do the trick. Ovens should be cleaned weekly or immediately after abnormal deposits. Although the oven walls have speckled enamelling to reduce the appearance of tarnish, the acid nature of some food residues can, by being baked in hard, permanently discolor the enamel. Preferably the oven bottom should be removed to permit cleaning in the joint next to the wall.[6] *Never apply cold to a hot oven* interior or exterior as there is likelihood of the enamel contracting violently with consequent cracking.

Carefully designed gas ranges have ovens with recessed oven rack guides or, if projecting guides, the edges and ends are rounded. Such practice prevents the aggravation of

(Continued on page 54)

[4] *Among the outstanding weaknesses of medium and low priced electric ranges currently marketed is the small effective oven capacity incident to the installation of both oven heating and the broiling elements in the bottom and top respectively. The useful baking height in the vast majority of electric ovens is scarcely 11″ causing many gas men to snort derisively at the LIGHT HOUSEKEEPING CONTRAPTION. An electric range user justly has misgivings over tackling the baking of a HE-MAN Virginian ham—the 20 lb. variety would have to have entrance into an electric oven via the can opener route.*

[5] *A handy table showing heat input for different size ovens is shown on Page 228 of "Range Manual" of the American Gas Association.*

Some gas companies follow the practice of "over gasing" the oven, that is, allowing a greater Btu. input than the manufacturers' ratings, on the theory of more rapid heating. Probably no harm is done provided the vent adequately conducts away the products of combustion.

[6] *Incidentally did you ever witness the disastrous effects of the boil-over of a deep dish cherry pie on an open electric oven element? Or did you ever have to remove and clean any kind of an electric oven element?—try it sometime and you'll never wilt under the rashness of the electric man's easy-or-no-cleaning statements.*

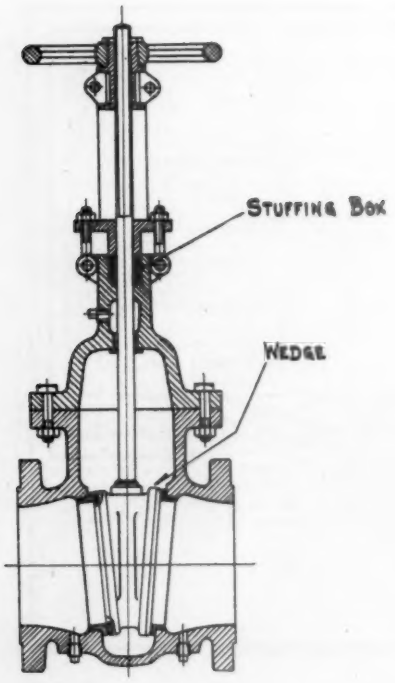


FIG. I

Lubricated Plug Valves

By Allen D. MacLean

Chief Engineer, Pittsburgh Equitable Meter Company

PROBABLY the most nearly basic invention of all time is the wheel. The entire science of transportation is founded on it, and the inventor of the wheel, whose identity is lost in antiquity, deserves the thanks of thousands of generations of humans. Without the almost unlimited mobility which the wheel has given man, his progress would have indeed been slow.

Just as essential to gas and liquid transportation as the wheel is to vehicular transportation, is piping through which fluids can flow. It is a basic invention whose importance we often fail to realize. It is, of course, an improvement on nature's method of liquid transportation—streams; and man has done well in working out satisfactory liquid transportation methods based on piping systems.

As a necessary complement to the operation of the wheel in vehicular transportation, the brake was developed. High speeds in transportation were only possible when good and reliable methods to modify motion or completely stop wheels were provided. In liquid and gas transmission we must rely on the valve to control or completely stop the flow of the fluid. The valve as used in fluid transmission performs the same function as does the brake in vehicular transportation—is just as essential to successful pipe operation as the brake is to the wheel.

Valves, because they must be frequently operated to modify, control, or stop liquid and gas flow, present themselves forcibly to our attention and we find ourselves concerned frequently with various phases of valve operation. Those concerned with the operation of valves know that they must move throughout their range without excessive sticking; they must completely stop flow in their closed position; and they must not allow the fluid being handled to leak to the outside. These are the essential points to be considered in valve operation. Working pressure, flange dimensions, pressure loss—physical size and arrangement are also factors, which must be taken into account in valve design.

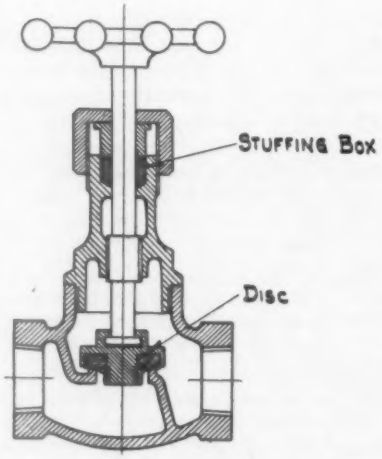


FIG. II

The sluice gate used to control flow in open flowing streams served as a model for the gate valve which was used in early forms of closed piping systems. The gate valve is produced in a number of different designs, and since its inception has been the subject of a large amount of research and development. In Figure I is illustrated a typical gate valve design, in which a wedge shaped member is lowered into a slot provided for it in the main valve body. There are many design variations possible in this type of valve; some designs use external rising stems while others obtain the disc motion by providing threads on the stem which engage with internal threads on the disc. In some cases a solid wedge is fitted into the recess in the body, in others, such as the one shown, there is provided a wedging means to force the two sides of the split disc against the seats to aid in making the shutoff. A packing gland is used around the valve stem to prevent leakage of the fluid.

A second type of valve is called

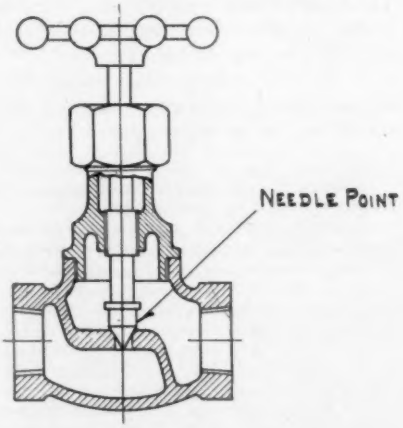


FIG. III

the globe valve, and is used particularly in the smaller range of sizes. It provides for a fixed partition across the line of flow which is provided with a circular opening. A second member, a disc, is arranged so that it can be made to engage with a seat in the partition and thereby shut off the fluid flow. Figure II is typical of this type. A slight modification of this type is shown in the so-called needle valve illustrated in Figure III. Both of these types are provided with packing glands to prevent leakage along the valve stem.

A very radical departure in valve design occurred with the introduction of the "tapered cock," an elemental form of which is shown in Figure IV. Here the possibility of tightly fitting two tapered surfaces together, one inside the other, is utilized. The flow is controlled by turning the inside member of the valve through a right angle, so that the passage through this member either coincides with the line of flow of the pipe for the open position or is exactly at right angles to it for the closed position. By using tapered surfaces, which are easily manufactured, one rotating inside the other, a tight fit is obtained; this fit can be increased in its tightness by forcing the inside member with greater force into the outer member.

The many inherent advantages of the tapered cock were outweighed by faults which made themselves apparent in use. The two most glaring deficiencies were first, possibility of leaking by the mating tapered surfaces, and, second, possibility of the two mating surfaces "freezing" or sticking together, especially when the

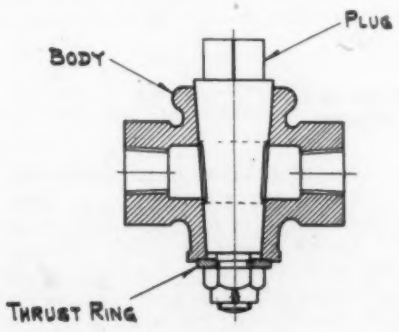


FIG. IV

valve was left in one position without turning for a long period of time.

One modification of the tapered plug cock designed to facilitate turning and to provide a large force for pressing the tapered sealing surface together is known as the "mechanical lift" valve, illustrated in Figure V. In this design a ring is placed around the main plug stem and when this ring is rotated the rotary motion is transformed into lifting motion by means of either a cam or threads and the lifting motion is transferred to the stem. This lifting motion, of course, tends to withdraw the plug by a small distance from the body and permits the main valve plug to be rotated. When this plug is ro-

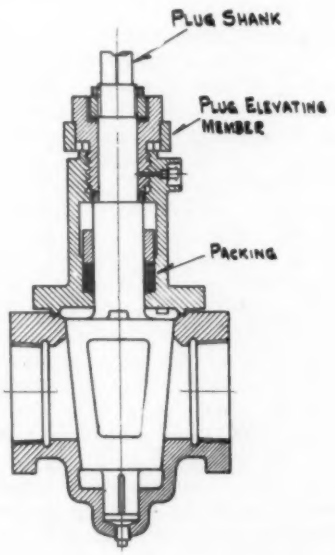


FIG V

tated to the desired position, the locking ring is then turned in such a way as to force the plug downward into the body at this new position.

A most successful and very ingenious method of making available all the inherent advantages of the tapered plug cock and to eliminate all of the disadvantages was developed about 1914 by Sven Nordstrom, a mining engineer. Mr. Nordstrom was confronted with the problem of providing a satisfactory valve to handle some of the chemical solutions used in refining ores. The corrosion and erosion caused by the liquids handled taxed the ability of every type of valve tried and in order to obtain a satisfactory valve for this service, Mr. Nordstrom developed the *lubricated* plug valve. The features which have made this valve so acceptable in the mining industry were soon recognized by other industries and the valve so developed has found a wide and ready acceptance in all branches of fluid transmission. Gas companies in transmission and distribution—oil companies in production, refining and selling—water

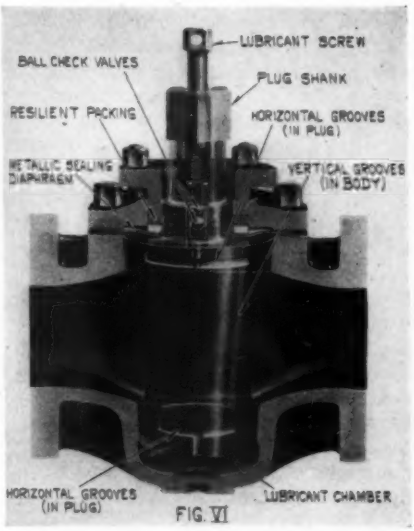


FIG. VI

works and chemical industries now include the lubricated plug valve as a very essential part of their equipment.

The ingenious method of applying lubricant to insure easy turning and complete sealing is shown in Figure VI. It will be noted that the body of the valve is tapered so as to engage with the tapered plug. The actual manufacture of the two tapers is a question of proper production machinery, and a high degree of accuracy can be maintained in both the size, degree of taper and finish of these parts. A lubricant system is provided starting at the top shank of the plug, at which point lubricant in the form of a cylindrical stick, similar to a candle in appearance, can be produced and forced downward by a tight fitting screw. The lubricant channel then passes downward through the center of the plug shank and just below the top of the tapered section of the plug it is permitted to branch out in two opposite directions and communicates with horizontal channels formed on the external tapered surface of the plug. In the body at points 90° apart and straddling the line of flow, there are four grooves running vertically from the top towards the bottom along the tapered surface. In actual operation these grooves communicate with the horizontal grooves in the top of the plug and the flow of the sealing lubricant now takes place downward along these channels in the body. At the bottom of the plug we find a second series of grooves part way around the periphery similar to the ones at the top. These, too, communicate with the vertical channels in the main body and receive lubricant from them. The lubricant is led from that point downward to a

chamber formed between the bottom of the plug and the main body. Thus any lubricant forced into the top of the shank travels first downward through the shank of the plug to the horizontal channels in the *plug* itself. These channels communicate with the four vertical grooves in the *body* which carry the lubricant down to the horizontal channels at the bottom of the plug. From this point the lubricant is forced onward and completely fills the chamber under the small end of the plug. Thus, this chamber and all the channels leading to it are continually filled with lubricant.

Functions of Lubricant System

There are really several functions of this lubricant system. One is to provide a lubricant for the mating tapered surfaces. As the valve is turned to its various positions, some of this lubricant is carried along so that it forms a seal and prevents the escape, in any direction, of the fluid being handled and prevents the actual seizing of the two tapered surfaces when left in stationary contact for long periods of time without being turned. The design of the grooves is such that when the valve is in the closed position, that is, when there will be no flow of fluid through the valve, a complete seal of lubricant is formed between the plug and the body around the opening through which the valve communicates with the line. In the closed position horizontal grooves in the plug are above and below the aperture through which the valve communicates with the line and on each side of this aperture the vertical slots in the body form a seal. These two sets of channels communicate and form a lubricant seal around both the inlet and outlet communication points.

An important point to note in the design of the tapered plug cock is that in its open position, that is, the position in which the fluid is flowing through the valve, those surfaces of the plug which are expected to perform the sealing operation when the valve is turned to its closed position, are entirely protected from the fluid being handled; for in the open position the greater part of the plug surface is not only in contact with the body but also is protected in its contact by the formation of a complete circuit of lubrication around these surfaces. Thus when the valve is called upon to shut off, the surface presented to effect this sealing is one that has been, while in the open valve position, continually protected by lubrication. It will be seen then that the lubricant not only protects the valve by maintaining the contacting surfaces clean and lubricated, but also in the method by which it is led through the various parts of the valve actually forms seals of lubricant and aids the actual metallic surfaces in maintaining and preventing leaks. Any motion of the plug at all causes a "sweeping" of the plug surfaces past the four filled grooves in the body—thus lubricating the surfaces thoroughly.

Another function of the lubricant is to provide a hydraulic jack by which it is possible to lift the plug vertically through small distances, thus overcoming any tendency of the tapered surfaces to stick together. It will be seen that any pressure generated by screwing down on the top lubricant screw is transmitted according to the laws of hydraulics through the various channels to the bottom chamber under the plug. This pressure applied over the entire area at the base of the plug presents a force of considerable magnitude and moves the plug up by a very small amount, however, enough to insure that it is not sticking to the body. Under these conditions it is easy to move the valve in the plug and still a complete seal is maintained. It is interesting to note that the upward force of the lubricant pressure is resisted by a resilient packing at the top of the valve. The function of this packing is not to seal against the possibility of the fluid leaking, as in the case of the packing around the stem of a gate valve, but is to provide the necessary resilient reaction against the lifting effect of the lubricant pressure under the plug. Hence, we have in effect a balanced system tending to maintain the plug floating and in a position which it can effectively seal and still permit easy movement. The upward force of lubricant pressure is positively and accurately balanced by the resilience of the packing. The packing, of course, is very carefully chosen and so arranged that it will stay in permanent position. It is not necessary to take up on this packing by means of a gland, as is done in the case of the conventional packing used for the purpose of preventing leakage around the stem.

Any tendency of the fluid being handled to leak by the top of the plug and on up by the shank is resisted at several different points. First, we have a lubricant which has been, in the operation of the valve, distributed along the tapered surfaces above the ports. Second, underneath the resilient packing there is provided a member which is fixed to the valve body under the main hood and bears down on the top of the plug. This member is made to contact the top of the plug by a force equivalent to the total vertical components of the lubricant pressure. These surfaces form a second efficient seal. It will be noted that the actual packing rings used are not designed for the purpose of pulling in radially against the shank of the plug. There is no requirement at this point for the preventage of leakage and the packing rings are not designed to contact the shank of the plug; their one and only function is to provide the necessary resilient resistance to the lubricant pressure.

As can be well realized, the nature of the lubricant for the lubricated plug valve is important. First, it must resist any chemical action of the fluids being handled, second, it must resist the temperature changes to be encountered without becoming too soft or too hard, third, it must have a consistency that can be satisfactorily molded into sticks to permit easy application to the valve, fourth, it must have the proper viscosity so that it can act as both lubricant and seal for the mating surfaces. Continual research has provided very satisfactory lubricants for practically every kind of fluid. Natural gas, casing head gas, refinery gas require a lubricant which will resist the action of the solvents contained in them, and research has provided this material. Manufactured gas presents a problem involving drip oil and condensates. All of the fluids normally used in industry have been carefully studied and lubricants can be provided to handle them effectively.

Uses in Gas Industry

The gas industry in particular has shown an appreciation of the lubricated plug valve design. Gas leaking by closed valves at meter settings, regulator stations, control stations and other points in gas transmission and distribution has always been a source of trouble and danger. The lubricated plug cock has eliminated this possibility. As pointed out, the stuffing box of the ordinary valve is replaced by a series of seals held together under tremendous pressure, thereby eliminating valve stem leakage, which is a very serious hazard. At a great many locations in distribution and transmission plants it is

(Continued on page 56)

Gum Forming Hydrocarbons

Products of Thermal Decomposition of Petroleum

Part I

By W. Grant Annable*

GUM forming hydrocarbons are those hydrocarbons susceptible to polymerization, oxidation or both, and are products of the thermal decomposition of petroleum principally when such decomposition takes place at temperatures above 1000°F with the production of varying quantities of liquids in addition to gas.

A percentage of the gum forming hydrocarbons produced in oil gas making is removed from the gas by scrubbing, a percentage is consumed by the trade through combustion, and the balance deposited in the distribution system in the form of gums. The problem becomes apparent as the quantity of gums deposited in the distribution system leads to the misfunctioning of equipment. It is a question of time until the gum problem becomes serious, unless present oil gas making practice is improved.

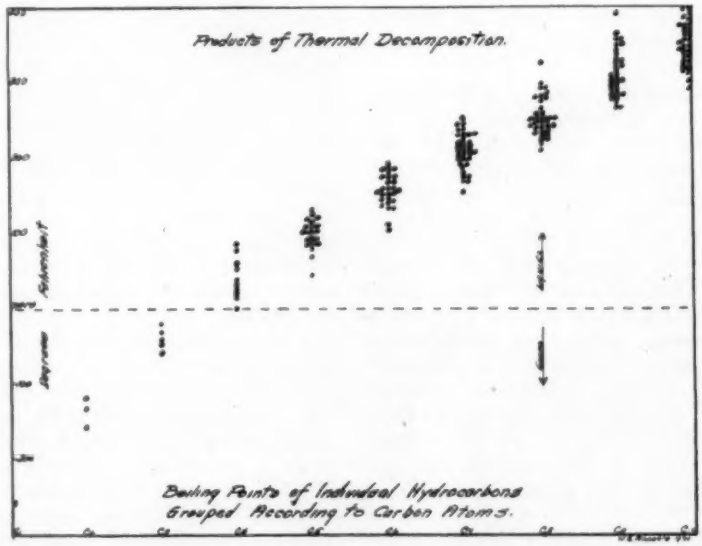
Generally speaking gas production increases, with temperature. A comparison of current practice in the industries, using heavy oil as charging stock, shows that the production of liquids or gas is primarily a degree of thermal decomposition, as follows:—

	Oil Industry	Chemical Industry	Gas Industry
Operating temperatures	900°F.—1100°F.	1250°F.	1200°F.—1500°F.
Production of decomposition			
Gas	12%—25%	50%	70%
Liquids	88%—75%	50%	30%

In each industry the raw material is oil and the reaction thermal decomposition, so that only the conditions under which decomposition takes place distinguishes the end products.

The accompanying chart shows the products of thermal decomposition in the oil and gas industries. Each dot represents an individual identified hydrocarbon with its boiling point.

The hydrocarbons appearing in the gas range are well known. Of the many appearing in the gasoline range only a percentage has been identified, namely, those indicated on the chart.



The desired product in the gas industry is a hydrocarbon mixture composed of hydrocarbons, containing from one to three carbon atoms per molecule, with boiling points below zero degrees Fahrenheit at atmospheric pressure. The desired product in the oil industry is a hydrocarbon mixture composed of hydrocarbons, containing four to ten carbon atoms per molecule, with boiling point within the range of from 50°F to 400°F. Products between the limits of the gas and liquid range, propane and butane, are desirable for the bottled gas industry.

Gum forming hydrocarbons are extremely unstable unsaturated hydrocarbons, diolefins in general and conjugated diolefins in particular. Conjugated diolefins must contain at least four carbon atoms so are really light liquids appearing in the gas through partial pressures. Such hydrocarbons as indene, styrene, etc., are heavier liquid hydrocarbons and the only reason for their appearance in the gas is that the gas industry produces liquids along with the gas, with the result that a small percentage is carried in suspension in the gas stream.

It is thus apparent that the source of the gum forming hydrocarbons in the oil and gas industries, the thermal decomposition of oil, is identical, so it will be well to review briefly the problem in each industry although the solution in each industry is quite different. The oil industry had a very serious gum problem which was successfully solved. The gas industry may well afford to give consideration to this extensive work in solving its present problem or in anticipation of the gum problem becoming more acute in the future.

Gums—in the Oil Industry

The oil industry, in order to improve the quality of the product and the efficiency of the processes for

* *Petroleum Engineer, Carburetted Gas, Inc., New York.*

producing gasoline from heavy oil, has been employing continually increasing temperatures. As the conditions of cracking become more severe involving higher temperatures new problems have arisen, such as gums, which had to be solved. Generally speaking, as the reaction temperature increases the percentage of gum forming hydrocarbons in the gasoline and gas increases. At temperatures of 1100°F or slightly higher, the gas and liquids formed are similar to those formed in the gas industry in enriching blue gas with fuel oil. Gum forming hydrocarbons are in the liquid products just as in the gaseous products of thermal decomposition, and the oil industry has studied their formation in the liquid phase, for therein lies their interest—the sale of gasoline.

Studying the reaction in the liquid phase has a decided advantage in that the slow reaction can be observed over a period of days, weeks, or months to study the mechanism, with the result that a clear conception of the reaction has been obtained. It is true that all hydrocarbons responsible for gums have not been identified nor the individual constituents making up the gummy mass, but as a group this is generally known, as is the oxidation mechanism of the reaction with the production of aldehydes, acids and peroxides, the amount of gum approximating, very closely, the production of the latter.

In this connection it is interesting to note that a sample of gasoline freshly produced will deposit gums in much less time if placed in an atmosphere of oxygen rather than air, showing that gum formation is governed, to a large extent, by the oxygen concentration.

With the advent of high anti-knock gasoline, a product of high temperature pyrolysis, the oil industry was confronted with the problem of marketing a product which if sold as refined, in a very short time, would cause carburetor trouble and valve sticking in gasoline engines through the deposition of oxidized hydrocarbons, i.e., gums. It would have been possible to refine the gasoline so highly that trouble from this source would not be encountered but in doing so the anti-knock quality would be sufficiently lowered as to defeat the purpose of such operation, and greatly increase the production cost of the product.

Gum formation is a time reaction, so in studying the problem the industry had to consider principally a small portion of their business, the gasoline sold in small quantities in outlaying places which might remain in storage for some time before being disposed of. It was eventually found that the reaction to gums could be retarded to such a degree that the gasoline could be marketed and sold before gums could be formed to the extent of causing trouble in gasoline engines. This was accomplished by the addition of oil soluble compounds, called inhibitors, to the gasoline in small quantities. The cost of such procedure is small compared to obtaining the same results through excessive refining and as far as the producer and consumer are concerned the results are the same.

In an industry as competitive as gasoline it is not unnatural that a satisfactory solution to the problem should be found in a comparatively short time, with the problem being attacked by a number of companies working independently.

The gum forming hydrocarbons of refinery gas have received little, if any, attention. It is well known, however, that gases produced by cracking stills deposit gums, and the higher the operating temperature of the cracking still the greater the gum deposits. The gums vary from sticky brown to very brittle brown masses, depending upon the extent of oxidation, polymerization or both, and are deposited chiefly in meters, the seats of gate valves and in needle valves. A small amount of air finds its way into the gas collecting systems of a refinery, so the gums are undoubtedly similar to those found in the liquid phase, but containing in addition to oxidized hydrocarbons, polymerized hydrocarbons and foreign matter collected in the gas lines. Traces of oxygen and nitrogen are present in the gas but not nitric oxide or nitrogen peroxide.

Gums—in the Gas Industry

Gums in gas making are a source of trouble to the gas maker in the distribution system, meters, valves, etc., and to the consumer through the misfunctioning of burners, pilot lights and automatic controls. With pilot lights and automatic controls increasing in importance and use the gas maker, in order to meet the requirements of the trade, will undoubtedly give the question of gums more consideration in the future.

Even though the source of trouble in the gas making field is the same as in the oil industry, the problem is quite different involving its own solution. It is chiefly an accumulative one, for it takes some time depending upon the concentration of the gum forming hydrocarbons in the gas, to detect visible evidence of the trouble, and the trouble may continue for a considerable length of time after the source of the trouble has been removed. This is occasioned by the fact that gas will not dissolve deposited gums but only keep them in motion, conceivably, by gas velocity. For this reason the problem cannot improve as long as coal containing volatile matter and oil play a part in the manufacture of gas under present methods of production. Treatment of the gas as now produced removes only a percentage of the gum forming hydrocarbons, but as the reason for the production of gum forming hydrocarbons is perfectly obvious, so is the solution or prevention of their formation. It is chiefly a question of close control of operation in which more suitable conditions of temperature and time of reaction are established.

With present production methods in which 30% liquids are produced along with the gas, the gums formed are similar to those produced by vapor phase cracking units in the oil industry. Linking the two industries brings up the two theories of gum formation, namely, one that they are the result of oxidation and the other that they are the result of the presence of nitric oxide and nitrogen peroxide more than an oxidation product containing, also such polymers and heavy hydrocarbons as may be dropped out of suspension by a change in velocity of the gas. Some very unstable unsaturated hydrocarbons may polymerize, oxidize or both, while others may merely change form. For instance, there are two forms of styrene, styrene and metastyrene, one a colorless liquid and the other a transparent solid. The change from one form to the other can take place under moderate conditions of temperature, but in reality the solid form is not an oxidized hydrocarbon or true gum. With present wide range of operating temperatures in the gas industry the formation and identification of the styrenes cannot be questioned as the products for its synthesis, benzene and ethylene, are both present under ideal conditions for the reaction.

It is very unlikely that the gas industry will be able to retard gum formation by use of inhibitors, not so much on account of cost but because of the combustion products. Even should a satisfactory inhibitor be found it is difficult to conceive how its use would be as economical

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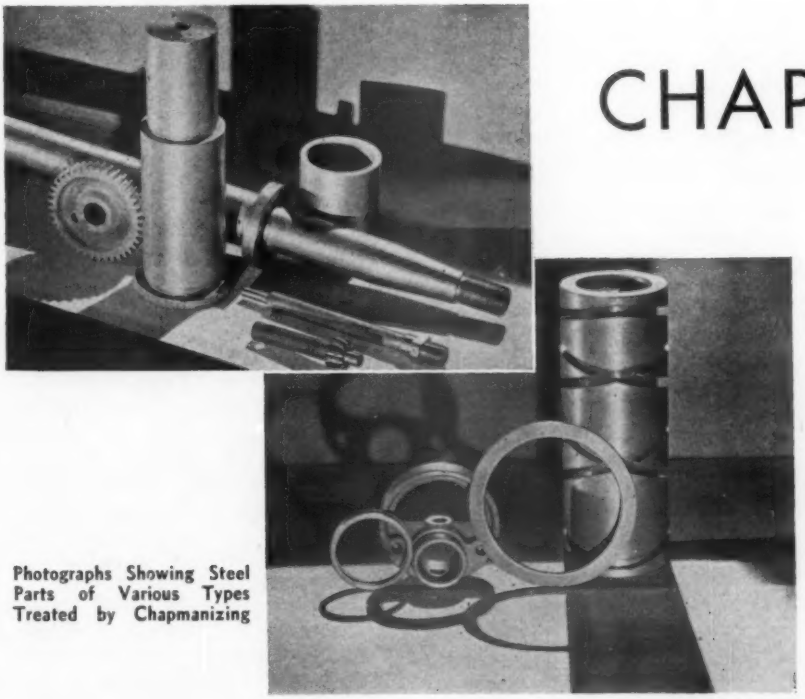


Photographs Showing Steel Parts of Various Types Treated by Chapmanizing

CHAPMANIZING

An Improved Case Hardening Process

Purpose

The purpose of Chapmanizing is to produce a very hard, ductile case on inexpensive steels, and which case is of such hardness and depth as to resist the most severe service wear and abrasion. The case so produced will hold its surface under heavy sliding pressures and will not suffer from abrasion or exfoliation due to great pressures and velocities that may be used, and will be stable under the conditions outlined and be capable of resisting for the economic life of the equipment, of which it forms a part, stresses and wear to which it will be subjected.

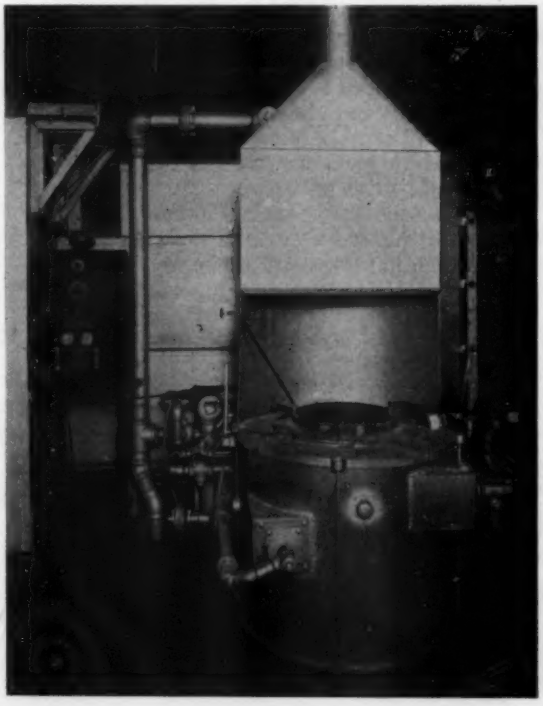
Process of Chapmanizing

The process of Chapmanizing is founded on the fact that iron base alloys will absorb certain hardening elements when heated either above or below the critical temperature. In the Chapmanizing process this is accomplished by heating the steel in the presence of an active nitrogen gas. A liquid bath is used to convey the necessary heat and active nitrogen direct to the steel under treatment and this active nitrogen penetrates the metal to a considerable depth. Ammonia, an inexpensive and readily obtainable gas, is supplied from pressure tanks to the Chapmanizer, a part of the Chapmanizing equipment.

In the Chapmanizer the ammonia gas undergoes an electrical reaction producing an active nitrogen gas which is delivered to the liquid bath. The reaction that takes place in the Chapmanizer is the "heart" of the process, for ammonia gas, when introduced directly into the liquid bath is non-effective. It is therefore the function of the Chapmanizer to transform the ammonia gas into an active gas with the exact properties required for the Chapmanizing process.

The liquid bath used for Chapmanizing has distinct advantages over other methods of hardening as it permits uniform and rapid heating, flexible operation, and ease of control, and is non-fuming and non-corrosive at the temperature of normal operation.

The work to be treated may be placed in the bath at ordinary temperatures or preheated, as the case may require. Upon immersion it is instantly coated with a layer of solidified compound which melts slowly enough to prevent overheating of the surface and consequent



Observe Chapmanizer on Left and Small Pipe Leading Into Gas Fired Pot Furnace Conveying Ammonia Gas

distortion of thin, irregular shaped pieces. The fused compound, maintained at uniform temperature by convection currents, supplies heat evenly to all the immersed surfaces of the steel treated. As the total mass is small it absorbs or gives off heat quickly. This makes it possible to control accurately the length of time that the metals under treatment are at heat.

The flexibility of operation provided by the Chapmanizing bath is particularly important in plants where a variety of work is treated. Many different parts may be put in the bath at the same time and if the time required for treating these parts differs, they may be removed as desired without disturbing the remaining work.

Chapmanizing may be carried out in a gas heated pot furnace. It can be accurately controlled to give identical results, cycle after cycle, to meet specifications.

Contrary to the characteristic that may be expected of such extreme hardness, the Chapmanized case will not chip or flake under hard service and will not crack, even when the parts are subjected to considerable bending. Core toughness and ductility may be maintained in the steels, even after Chapmanizing.

The substitution of inexpensive low carbon and free machining steels, made possible by Chapmanizing, opens the way for many changes in specifications and subsequent savings in cost. Table of specifications and characteristics of Chapmanized steels follow:

1. *Parts and Forms that can be Chapmanized* — Machined, forged, stamped, rolled or cast steel parts, small and large.
2. *Specifications of steel*—Any type of steel can be satisfactorily Chapmanized. Malleable and cast iron parts can also be hardened by this process.
3. *Hardness*—In regular process work the Monotron or Vickers Brinell hardness will range from 750 to 1100, depending upon the application of the treatment.
4. *Depth of case*—Any depth of case, ranging from .002" to .035", can be produced as required.
5. *Uniformity of hardness and penetration* — Penetration or depth of case and hardness will remain constant for types of steel being treated.
6. *Growth of parts*—The only growth that takes place is due to the absorption of nitrogen, and this may be compensated for by a slight lapping or grinding operation in finishing the piece.
7. *Warping or Distortion*—No appreciable distortion or warping takes place.
8. *Finishing tolerances recommended*—The maximum hardness of Chapmanized case is ground at .002" to .003" under the surface, therefore, it is advisable to leave parts slightly oversize for finish grinding.
9. *Straightening of Chapmanized metals*—Straightening may be necessary on thin, flat sections or in parts having different diameters or comparatively long pieces. It is easy to straighten such parts even when cold without cracking the case.
10. *Wear Resistance*—Chapmanized metal will outwear carburized metal about seven to one. It will not chip or flake under severe use.
11. *Resistance to Corrosion*—While Chapmanized steel is not a corrosive resistant material, it will resist to a great extent the attack of fresh and salt water, superheated steam, fuel oil, locomotive gases, alkaline solutions such as caustics, ammonia, etc. It is not, however, resistant to corrosive conditions due to mineral acids, etc.
12. *Hardness at elevated temperatures*—The Chapmanized case remains hard up to a temperature of approximately 700 degrees Fahrenheit.

TABLE 1

Physical Characteristics of Chapmanized Steel

(S.A.E. 1020 Steel Chapmanized for 3½ hours at 1540 degrees F. Water Quenched.)

	Hardness Readings		
	Rockwell A	Rockwell C	Sclerescope
Surface	85	66	86
.005" under surface	86	63	90
.010" under surface	80	58	85
.015" under surface	75	53	77
.020" under surface	72	48	70
.025" under surface	70	44	65
.030" under surface	70	42	62
.035" under surface	70	40	60

TABLE 2

Chapmanized Case Depths

(Test pieces 1" diameter 6" long.)

Time at Heat	*Case Depth in Inches* 1450°F.	1540°F.
15 min.	—	.004
30 "	.005	.007
60 "	.010	.015
90 "	.015	.020
120 "	.018	.025
150 "	.022	.027
180 "	.025	.032
210 "	—	.035
240 "	—	.040

TABLE 3

Increase in Carbon
.18 carbon steel Chapmanized
1450 F. 2 hrs.

Surface	.40 carbon
.004" under surface	.31 carbon
.008" under surface	.25 carbon
.012" under surface	.20 carbon
.016" under surface	.18 carbon

TABLE 4

Wear Tests

The table indicates results obtained on wear testing of several materials, run dry against each other, using a reciprocating motion, ninety strokes per minute, two inch stroke, with a load of forty pounds per square inch. Total number of strokes—30,000.

		Loss in weight grams per sq. in.
SAE 1020 Chapmanized	vs SAE 1020 Chapmanized	.0017
Nitrided Steel	vs Nitrided Steel	.0018
Carburized Steel	vs Carburized Steel	.013
Hardened Tool Steel	vs Hardened Tool Steel	.116

The Chapmanizer and method of hardening metals are covered by patents owned by Chapman Valve Mfg. Co., Indian Orchard, Mass.

"Mystery Chef" Broadcasts Expanding

The latest companies to join The Mystery Chef radio program are the Birmingham Gas Co., Birmingham, Ala., and the Department of Public Utilities, City of Richmond, Va. Both companies will use electrical transcriptions.

The Birmingham company inaugurated its program May 1 with three Mystery Chef talks a week. The Richmond Department of Public Utilities expects to start its program over Station WRVA on May 5.

There are now sixteen companies having more than 500,000 domestic gas meters in operation that are using electrical transcriptions. One hundred and four additional companies are participating in the program through the original network of thirteen radio stations. Distribution of the recipe book, "Be An Artist At The Gas Range," to date has been 652,000 copies.

In his broadcasts scheduled for May 15 through June, The Mystery Chef will explain his easy method of canning fruit and will also offer to brides and brides-to-be who call in person for the recipe book at participating gas companies a personally autographed book plate containing this message: "This book is the property of (name of recipient) An Artist At The Gas Range and carries with it every kind wish from your friend and fellow artist, The Mystery Chef."

Observations on Meter Practices

In A Ramble from Coast to Coast

By W. F. Henderson

LAST fall I made a 10,000 mile trip covering parts of the United States and the eastern section of Canada. This trip was made primarily to study gas meter practices with general observations of the gas industry as a secondary consideration.

While one meter shop might be more elaborate than another, I found very much the same practices all over the country. The only dissimilar features I observed was the lack of a planned procedure in a few shops. Fully half of the companies had placed an engineer in charge of meter operations. His duty was to obtain facts and accumulate the necessary data that would enable him to establish repair procedure with respect to accuracy. In some of the shops his duties led him into other fields, which gave him an outside approach to the subject.

In looking over the former practice sheets and comparing them with the present procedure it was interesting to note that the industry was gradually drawing away from its traditions of the past. Questions arose as to the need or merit of some working parts in meters. In some the diaphragm guides had been removed, and no apparent detrimental effects resulted. Another company was leaving out the click, not because of the noise, but no good reason for the continued use of this meter part could be seen.

The most startling deviation from past practice that I observed was two companies performing a minimum of work on time limit tin meters. After observations for several years, particularly with respect to diaphragms, on all ages of meters they adopted this plan of procedure. It calls for the removal of the back plate and testing each diaphragm through the port with a pressure not exceeding four inches water column. If a drop in pressure was shown, one or both cases were removed and the diaphragms tested under water to locate the leak. Any small leak in the diaphragm was shellacked or resoldered, as the case may be. The results of this radical change will either

W. F. HENDERSON

prove or disprove itself in time. Both companies that had adopted this procedure were using semi-chrome tanned diaphragms, and have realized to date fourteen years and with every indication of twenty years or more. The reasoning back of this plan was justified by its adherents from the standpoint that a meter is seldom overworked, generally running at one-third to one-sixth of its rated capacity, and with clean gas it is unnecessary to wash out the inside of the meter. Also, every meter has its individual characteristics and, therefore, offers a case study. With the improved materials that are placed in the meters now on the market and the improvement in conditioning of the gas that passes through the meters, this plan must answer to some extent the question of when to repair a meter.

Even though apparently considerable advancement has been made some personal prejudices and opinions were in evidence. This was impressed upon me by the following examples: Three companies were installing heavy leather diaphragms with oil well impregnated, but without any excess oil, in their 5-light meters with the deductions that if the meter were proved with a stiff diaphragm it would tend to be of the same proof when or if the oil were removed from the leather. Two other companies were placing soft, semi-chrome tanned leather diaphragms in the meters for the same result. My findings were that each one received what it sought, with the latter companies getting two or three times the average expected life.

Another one involved the question of valve grinding. The majority of shops faced the valve seat with a sandstone block, and the valve cover with a sheet of fine emery cloth cemented on a piece of plate glass. Some even went to the extent of producing a mirror like polish by using pumice powder on leather. A few companies had trouble with valves sweating by the above practices, and were using steel blocks instead of sandstone rubbing blocks. The covers were lapped with emery paper and were not buffed. Where I found a very humid gas being distributed there was a tendency however for the valve to sweat and leave a deposit if it had a tight seat.

The prover room presented another opportunity where opinions differed. A minority of the shops were using oil as the seal in their provers. From what I heard, the maintenance of the prover was about half as compared to those that used water. Of course, it is necessary for some companies to prove with a water saturated medium, but this could be cared for by using an air lift on the provers. The opinions on refilling the prover varied all the way from the use of compressed air or gas to that of sucking in prover room atmosphere by hand. The use of gas as a testing medium is still mootable. If it is desired to use room atmosphere one could utilize a small

EDITOR'S NOTE—*W. F. Henderson, son of W. M. Henderson, Supt. of Distribution, Los Angeles (Calif.) Gas & Electric Corp., recently toured the U. S. and eastern section of Canada in a five-year old Ford, covering a distance of 10,000 miles. He visited 23 gas companies, 3 meter factories, A.G.A. Testing Laboratories and U. S. Bureau of Standards in Washington, D. C., to study meter practice used. His findings are published herewith.*

blower placed within the room, thus relieving the operator of any old ideas in connection with prover room activities.

Cases like these are not uncommon. It is well there is this difference of opinion; for as I see it, it will tend to develop new lines of reasoning.

The observations I made in the field of distribution practice were limited to a few companies. I did, however, notice that in general the practice varied a great deal from the methods used on the West Coast, and I recognize that there is a very different problem where frost is encountered. Nevertheless I fail to see why a company will weaken a piece of pipe with cut thread joints, or subject their system to leakage with pipe saddles, when welding has successfully demonstrated its advantages.

In speaking of pipe, one eastern company was running lead joints on a new cast iron line. It was doing this in the face of thousands of bell joint leak clamps being installed all over the country. In the light of all the different varieties of mechanical joints for cast iron that are on the market and have been A. G. A. approved, it rather impressed me to see the adherence to traditional practice that still exists.

Protection for steel pipe has not been widely adopted. Whether or not the loss by corrosion was not sufficient to take into consideration, or that the utilities are not cognizant that their substructures are corroding, was the reason for its scattered adoption was hard to determine. From the few examples of corrosion I observed I think it would be to a company's advantage to collect samples of pipe failure due to soil wheneyer a replacement is made. The few companies that have collections of this nature have found it well worth their while.

Few of the major gas companies were without their own appliance testing laboratories. While the purpose of the A. G. A. testing laboratory is to pass on minimum standards, it is also the information that is to our benefit to know just what is the maximum performance to be expected from the various types of appliances on our lines. Other ways in which the company laboratories were used to a full advantage were instructions for new employees, testing gadgets such as thermometers and other field equipment, and running equipment studies to combat electric propaganda.

Some of the practices which were too general to specifically locate included the following items: Gasoline operated pavement breakers have been accepted by the utilities in the West, but have gained little favor in the East. Dust scrubbers and oil foggers in use by the majority of the natural gas distributing companies. Steam fogging was on the decline. The use of oil as a holder seal is confined mostly to the West Coast. Pressure control devices for shutting down a line, dating from the time of our forefathers, were in general use. It appeared to me that little regard was given to either the consumer or the employee when the job called for maintenance or construction work on a live main.

The house regulators were mostly of the conventional type, and occasionally some company would use nothing but mercury seals. The arguments I heard upholding the mercury seal regulators were not as good as those for the conventional type. The slight possibility of diaphragm failure causing damage does not warrant the added investment and care, and modern appliances with pilots have greatly reduced the lock-up requirements.

Extensive use of the boring machine is confined to the West Coast with the Middle West a close second. The Providence, Rhode Island, Gas Company had in use a hand-generated, quick-acting, vacuum tank for choked services that was very much of a success in their service. This was of a standard make, but it was the only one I saw.

Utility companies were with but few exceptions using the closed cab type of meter truck. Some even had in operation the panel body trucks for all types of consumer and meter work.

As this article, similar to the trip, started out to be a study of meter practices it would be no more than right to end it by enumerating some of the specific points I observed pertaining to meters.

In almost every shop eight-strand Germantown yarn was used for stuffing box packing. The grease was invariably mutton tallow, although some of the shops had their own specific mixtures. I observed only one shop using graphite of any form. A few shops use felt washers. The new type of tin meter case, the lay-on case, has met with prejudiced opinion. Even though the lay-on case was recognized as a definite advance over the old by many companies some persisted in using the slip-on type which requires a wrecking bar to dismantle. Detachable back plates and diaphragm rings built up at the throat to prevent burning of the leather have met with a divided opinion. It is interesting to note that the only reason I received for not using the new type diaphragm ring was that a man had to be a better meter repairer to use the old style. Gasoline, instead of a cleaning solvent, where fire laws permitted had greater acceptance and seemed to do a better job. The electric screwdriver, and the air-operated wrench were standard equipment in two large iron meter repair shops. The electric stop for prover use was reported unsatisfactory. Meter bars for large as well as for small tin meters are being used extensively throughout the country. The theory of using so many ounces of oil in each side of the meter to keep the diaphragms from drying out with the use of natural gas still remains a controversial subject. It appears to me that the original diaphragm dressing plays the most important part in leather lubrication, and also that excess oil introduced through the valve ports invites trouble with respect to gummy valves. A draft gauge for measuring the drop through a meter while proving was used extensively to check the meter for binds. All meters registering a certain drop were sent back to the mechanic to be worked over.

Relevant shop wrinkles and equipment, very much depends on what an individual is particularly seeking. The following list with references records but a few of my observations. They are the only ones that I think meet the common need.

There is a tin meter washing machine, for washing the interior and the exterior of the cases and also the parts, in the New York City shop similar in design to those in Brooklyn and Chicago. Even though its place is limited, it is well worth seeing in operation. The Southern Counties Gas Company (California) has an iron and tin meter washing machine that could be used by a small utility, as there is very little investment tied up when the machine is idle. It will wash the exterior of approximately one hundred meters per day; interior of meter not washed by machine.

The Chicago gas company uses a testing rack that combines oil and air testing in one operation. This shop also has an original way of keeping track of the batting average of all its repair men, and from all indications it was very effective in increasing quality production.

The Sprague Meter Company has developed a valve seating machine

(Continued on page 54)

Galvanized Tank Corrosion On Automatic Water Heaters

PART II*

A. F. Craver
Engineer, The Cleveland Heater Co.

Pitting

Submerged corrosion is never general but localized in active and inactive areas resulting in deep holes or pitting. All the corroded tanks which were investigated showed deep pitting and all tank failures were caused by deep pitted holes generally located in the upper part of the tank.

There are many factors which may cause this localized corrosion. The very fact that the protective coating of zinc cannot be entirely uniform when turned out on volume production would at once offer the possibility of corrosion being more active in one part than another. There may be a positive and negative area very close together on the same metal surface which in itself will cause localized corrosion. If such a condition is intensified by creating an electrolytic reaction between unlike metals, the pitting will be greatly increased.

It was found that in the majority of investigated tanks, failure caused by perforation occurred before 5 to 20 percent of the metal had been removed by rusting. In tanks where metal potential difference was not intensified, corrosion seemed to be more general and widespread. Although these tanks did fail by perforation due to simple corrosion, the pitting was not so localized and the life of the tank was appreciably longer. A more or less protective coating of fine rust seemed to be widespread over these tanks.

In the tanks where there were no metal potential differences, the pitted holes were also located near the top of the boiler. Most of these tanks contained a galvanized steel dip tube for a cold water inlet. This tube in all instances was perforated in various places. These holes did not follow the general rule of being always located in the hottest water zones, but appeared on the entire length of the tube. In some instances, the bottom of the tube had become clogged with foreign matter and the cold water was distributed through the entire length of the boiler by the perforated tube.

It was concluded from these tanks containing the galvanized steel dip tube that a part of the corrosion was concentrated in the dip pipe thus saving the tank itself. Such a combination although unsatisfactory in many ways, did change the corrosion characteristics and conditions and added life to the tank.

Stray electric currents, of course, cause pitting at the point of discharge. Stray electric currents are not very common in water heating systems. However, a theory has been advanced recently, that the grounding of radios on water pipes had the same effect and increased corrosion and pitting.

Variation in the concentration of the electrolytes in the solution in contact with the different metals also tend to localize corrosion. Although the local water supply will not tend to change its chemical composition except in hot seasons and low water supply, the chemical composition will change from one vicinity to another.

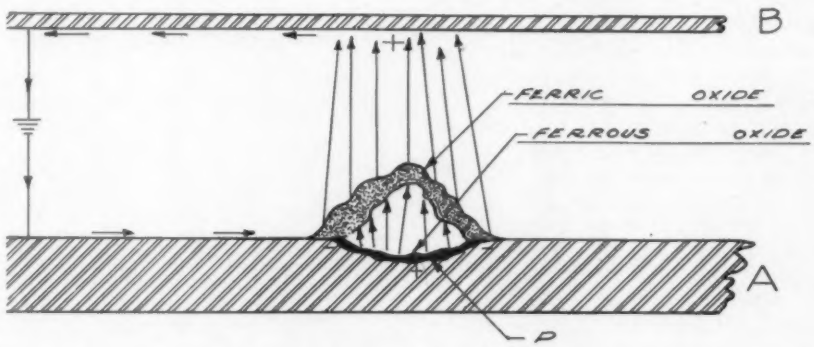


FIG. 10 — PITTING AND EFFECT OF METAL POTENTIAL DIFFERENCE

These variations will consequently localize pitting at certain points and at the same time tend to retard pitting at other points. The smaller these active areas, the greater the rate of corrosion at the active points, resulting in pitting and the formation of tubercles or small mounds of rust.

Fig. 10 shows the pitting action that may take place on a piece of steel or iron. This concentrated action may be caused by the above reasons and such things as defective material, mill scale, strain, concentration of electrolyte, air agitation, etc. Within a very small area a positive and negative surface may appear. The positive section P is the start of a cavity, and the exposed surface subject to all the air changes and external conditions will be negative. Ferrous hydroxide will be formed in the cavity due to only partial oxidation. This soluble acid salt mixing with the alkaline metallic salt from the negative or cathodic surface will become further oxidized and changed to the insoluble ferric hydroxide. Becoming still further oxidized it will turn into rust or ferric oxide of a reddish brown color. The ferrous oxide or rust which forms next to the metal, is of a black or green color. Between the two is a mixture of each. It is this little mound or tubercle of ferric oxide which appears so often in water tank corrosion. The mound keeps growing as the pit grows deeper and it is quite common to see a tubercle of an inch in height and one and one-half inches in diameter. This outer coating of ferric oxide is rather soft and can easily be removed.

In this instance, this outer covering of ferric oxide or rust will not tend to put a stop to further corrosion at that point. Since the corrosion rate depends upon the amount

*Continued from April issue

of oxygen present, and since it will be concentrated on the small area within the pit, the rate of corrosion will be proportional, and the metal may fail from perforation before any appreciable thinning has occurred at other parts of the surface.

Baylis has observed that when a tubercle of rust forms a dense outer covering of ferric hydroxide, hydrogen gas may then be liberated, accelerating still further the rate of pitting.

Now, if to this natural corrosion or pitting is added a metal potential difference, then the current flow is greatly increased. As shown in Figure 10, a metal A such as steel is placed in the same solution with an unlike metal B, such as copper. Due to the created metal potential difference there is a flow of current induced from A to B. If B is electrically connected in any way to A then the cycle of current will be completed through this connection. At the point of current discharge P, the corrosion will be greatest sending the metal into further solution. The pitting resulting from natural or simple corrosion may be increased fifty percent by this condition.

Radio Grounds and External Corrosion

It has long been a common practice to fasten radio ground wires to water pipes for ground connections and the question frequently is raised: what effect does this have on corrosion.

Let us first consider the radio. An efficient radio and the average radio of today does not discharge any power current from the radio to and through the ground wire. The ground wire acts only as a medium to cause a potential between the aerial and ground so that the radio waves coming through the air will enter the set. If there is any current flow from the set through the ground wire it is static current and so small in microamperes that it would not have any material effect. One microampere is one millionth of an ampere.

For sake of exception let us assume that the radio is inefficient and there is a slight power current leakage through the ground wire, and the ground is attached to a water pipe. A flow of current will necessarily follow the path of least resistance and will naturally discharge itself through the run of water pipe to the earth outside the house. That is, the water in the storage heater will offer much more resistance than a run of pipe to the earth. This was found to be a fact by actual meter measurements in the laboratory. If any corrosion takes place at all, it will be in the water pipe from the ground wire to the earth.

It is also quite possible to obtain a generation of current from the gas pipe connections to the heater. Under certain conditions where the gas mains in the street pick up stray current discharges from trolley lines, telephone lines, high tension wires, etc., it is possible for the gas line to carry this current to the water heater and cause corrosion. It may at the same time tend to retard corrosion if the polarity is opposite to that being generated in the boiler.

Again if the heater is electrically insulated, stray currents cannot harm the boiler.

Summary

The idea that electrolysis plays a most important part in boiler corrosion has I believe, been thoroughly proven by the preceding data and information. A great many engineers have taken too lightly the effects of unlike metals on galvanized steel boilers. Although oxygen and its control is the basic important factor, it is not the only factor, and the secondary factors in many instances have worse effect on boiler corrosion by greatly increasing the activity of the oxygen.

The proof of these statements after all depends upon what result their application has upon the retardation of boiler corrosion. Boilers of the underfired type of automatic hot water heaters were given these applications. In a locality which was previously troubled with fast boiler corrosion and excessive rusty water, these boilers containing protective applications have given no trouble after being in service for three and one-half years.

In another locality ten of these boilers were taken out and inspected after being in service for two and one-half years. There was not one of the ten which showed any sign of rust or corrosion. In another locality a boiler which had been in active service for two and one-half years did not show a single tubercle of rust.

The same was strictly true of several other samples taken from different localities. In these same territories, heaters without the electrolytic insulation showed marked signs of corrosion and rust tubercles were prevalent.

These results would tend to prove that the electrolytic insulating applications were satisfactorily protecting the tank from contact and external corrosion. It is not claimed that these applications will have any effect on simple corrosion. It will go on just the same, but not greatly increased by unnatural conditions. The galvanizing will now have a chance to perform its natural function and the heavier and better constructed tanks built today will add years of life to the automatic storage heater.

Stephen Smart Introduced at New Jersey Gas Convention

Stephen Smart was among the newcomers at the twenty-fifth annual meeting of the New Jersey Gas Association at Asbury Park, N. J., on April 2, 1936. An amiable, intelligent, typical person of no great means, Smart appeared unofficially on the program to point out the advantages in the use of gas in the home.

Mr. Smart appearing pictorially, poetically presented in print his views on gas cooking, water heating, refrigeration and house heating. His remarks were so well received that he has consented to appear on bill boards, on car cards, or in posters, should he be invited.

Following are pictures of Mr. Smart, and copies of his statements.

Stephen Smart now takes the bow
With ideal fuel he knows how
To heat hot water, cook and bake
And also to refrigerate

I need hot water when I bathe
I need hot water when I shave
The ideal fuel fills the part
Says connoisseur Stephen Smart

AS THE EDITOR SEES IT

The Flood of 1936

THERE is no need to tell our readers of the floods which swept certain sections of the east during the month of March. Many of them were in the flooded areas and knew only too well the terror and damage that were caused. The rest of us read of the conditions and perhaps tried to imagine what they were like. Frequently we would see brief mention of the fact that such and such a city was without electricity or pure water. Seldom did we see any mention of gas; and we could picture in our minds the dramatic struggle in many places to "keep gas on the town." Flooded plants, flooded mains, flooded governor pits letting high pressure gas into low pressure mains, wrecked meters, broken services—these were some of the conditions that would have to be met, and we wondered how the gas companies were "coming through"?

The flood is over and the record of the gas companies and their employees was just what we should have expected, efficient, tireless, unselfish devotion to something more than duty. Plants were kept in operation and service was maintained under almost impossible conditions. The flooded sections naturally were without gas, and in a number of cases adjacent areas were affected; but the instances where service failed completely were remarkably few.

In a somewhat matter of fact way the employees' publications in the flood areas tell thrilling stories of what happened.

In Binghamton, N. Y., "despite the fact that the rising water extinguished the fires in our plant boilers and prevented the distribution of regular mixed gas, prompt and efficient action made available an unlimited supply of natural gas, thereby averting a situation which otherwise might have resulted in serious consequences. During the entire period of the flood, only one section of Binghamton was without gas and that . . . was inconvenienced for only a few hours.

"Another ticklish problem developed when the receding waters uncovered a series of leaks at the base of our larger holder. Sandbags, rushed by truck from various sections of the city, were hastily piled around the sprung plates at the holder's base, effectively plugging the leaks until repair operations could be undertaken.

"The Home Service Department justly deserves the admiration and appreciation of the many men who have so highly praised the work of that loyal group of girls headed by our Home Service Director. Many long hours were spent by these girls who so capably provided meals for the emergency crews both day and night. Putting aside all thoughts of fatigue, they stuck to their posts until their services were no longer needed."

At Lawrence, Mass., advance preparations had been made and every available holder was full when the flood arrived. Manual operation of the coal gas plant was started, steam for exhausters and pumps being provided by the locomotive crane and an upright boiler rushed in by a local contractor. Later. a switching engine was secured and connected to the steam header, and the water gas plant was then ready to operate.

At Northampton, Mass., gas company crews worked frantically for three days prior to the arrival of the flood, removing gas meters in low-lying areas and preparing the plant for the expected emergency. Then all communication was cut off. "Telephone lines were down; bridges were inundated, and it was impossible to bring any reenforcements in from outside." There was no electric service during much of the critical period. "Weary crews laboring in a vain effort to hold the gas supply. Fighting against water which at one time was rising at the rate of two feet in fifteen minutes. Men working in water up to their waists and women employees . . . preparing hot meals for workmen.

"When it looked as though their fight . . . had an even chance of being successful, the flood waters got into the distribution system through a break in a main in one of the flooded streets" and shut off about 65 per cent of the customers. Even then the men would not give up "and vainly tried to pump out the leaking gas mains. The break was submerged by the flood, however, and the water came back into the mains as fast as it was pumped out."

A few hours previous to this break "the waters had risen to such a height inside the gas plant that the fires had to be drawn . . . Enough gas was stored in the holders, however, to supply the remaining customers (not affected by the flooding of the mains) until the receding waters allowed gas manufacture to be resumed (four days later). Even then the plant was still awash. . . . Easthampton, by ingenuity and speedy work did not run out of gas during the entire shutdown period."

The story of what happened at Pittsburgh is too long even to be outlined; but the spirit of the employees was the same as elsewhere. "Many of the men lived in flooded areas and did not know how their own property was faring. A few of them were not certain of the whereabouts of their families. Yet not one of them wanted to leave the job.

"Under these conditions of stress and under the strain of fatigue after more than 24 hours' continuous hard work it will stand as an everlasting monument to the ability, loyalty, efficiency and nerve of all the men that not one lost his head, that not one gave up to despair, and that not a single bad error in judgment was made." When it is realized that men were stranded here and there, without means of communication, with no way of securing help or advice, this record becomes all the more remarkable.

There were 20,085 customers without gas service. Most of these were driven from their homes by flood waters. Within two weeks service had been restored to about 17,800 of these. The homes of many of the rest have been destroyed or condemned. 160,000 customers or 89 per cent of the total received service as usual throughout the flood.

So it was every where with only variations in detail. The highest traditions of the gas industry for service were upheld without exception. In some places the gas refrigerator was the sole means of keeping food and serums, and the gas range was the sole means of cooking. The once obsolete gas lights became popular again and attics and storerooms were scoured for them.

The flood of 1936 is a thing of the past. In the

(Continued on page 40)

Note—The quotations in this editorial are from "The Gas Flame" (Binghamton, N. Y.); "Contact" (New England Power Association), and "Public Service" (Philadelphia Company).

Use of Copper Pipe for Gas Services, Drips, Etc.*

A Progress Report Based on an Inquiry Sent to Ten Operating Companies

by H. L. Gaidry

New Orleans Public Service, Inc.,
New Orleans, La.

DURING the past ten years considerable copper pipe has been used for underground construction work especially in areas where steel pipe corrodes rapidly. It was thought that perhaps the use of copper pipe had by this time passed through experimental stages and that a report on its application in the gas industry would be of interest to distribution engineers. To secure the information available, an inquiry was sent to certain operating companies, and a summary of the data disclosed by the replies to this inquiry follows.

Only four companies of those contacted are using copper pipe for distribution construction, and one of these has used it only experimentally to date.

Company A.

"The use of copper pipe in our system has proved very satisfactory and we expect to continue to use it in large quantities as long as the price of copper remains at or near its present level. We find that under our conditions, copper services can be installed for practically the same cost as wrapped steel services, and we feel confident that, in general, copper will have a much longer life than wrapped steel, and we are, therefore, using copper in preference to wrapped steel."

This property began the use of copper pipe in 1926, and offers the following data on its use as of June 30, 1935.

Main connections are either butt joints, or bell and spigot, and Sil-Fos soldered.

	Length (Ft.)	Installed (Cost)
10,686 Services	255,518	$247,568.21*
Mains—1½" and smaller	7,862	
2"	252,838	
3"	39,960	300,660 292,456.13
Total		556,178 $540,024.34

* Cost includes cost of curb-meter boxes. Services run from main to property line only.

Service connections to copper mains are made by the use of stamped copper saddle which is Sil-Fos soldered to the copper mains. A navy bronze cast tee is then Sil-Fos soldered to the service pipe and to the saddle. The service is then pressure tested after which the main is tapped in the conventional manner through the opening in the top of the tee with a tapping machine.

In service connections to steel mains Sil-Fos cannot be used to connect the copper to the steel, therefore, Tobin bronze or an equivalent brazing material is used. A protective coating is applied to the main, the service nipple and the copper service, at the connection, as a precaution against localized corrosion of the steel within 2 or 3 inches of the connection and dezincification of the bronze.

This company offers the following cost data (including company handling charges), on small diameter pipe:

PIPE COST IN DOLLARS PER FOOT DELIVERED TO JOB

Nominal Diameter	¾"	1"	1¼"	2"	3"	4"
Steel (Std. weight. No coating)	.057	.081	.108	.191	.368	.487
Copper*	.127	.162	.200	.350	.535	...
Cast Iron (Mechanical joint, 250 lbs. W. P. 16' lengths)	...	...	...	.320	.526	.630

* Copper tubing 17 Stubbs gauge sizes ¾"-1", and 1¼".
16 Stubbs gauge sizes 2" and 3".

This property has a high pressure distribution system operating at an average pressure of 3 lbs. per sq. in.

The mains are composed of 95% steel, 3% cast iron, and 2% copper.

Company B.

This property uses copper tubing to pull through existing corroded service pipes. It has not, as yet, gone to the use of copper pipe for new services.

Reports indicate that very satisfactory results are obtained by the use of copper pipe for replacement of deteriorated services. On high pressure work, a ⅝" nominal diameter copper tubing is pulled through a 1" steel pipe. On low pressure, a 1" nominal diameter tubing is pulled through a 1¼" steel pipe. The copper tubing comes in 60 ft. lengths and coiled. A maximum of 80 ft. of tubing has been pulled through an existing iron conduit by brazing two 60 ft. coils of tubing together to attain the required length. The use of Sil-Fos solder has just been started.

Service connection to a steel main is made with the usual steel tee or "Y" connection, which is welded to the steel pipe or brazed or screwed into the cast iron pipe. The copper tubing is then brazed to this connection. A wrapped steel riser bend is used to complete the service on the vertical run up to the meter shut-off connection. It is planned, however, to use a brass fitting for this riser in the near future.

Company C.

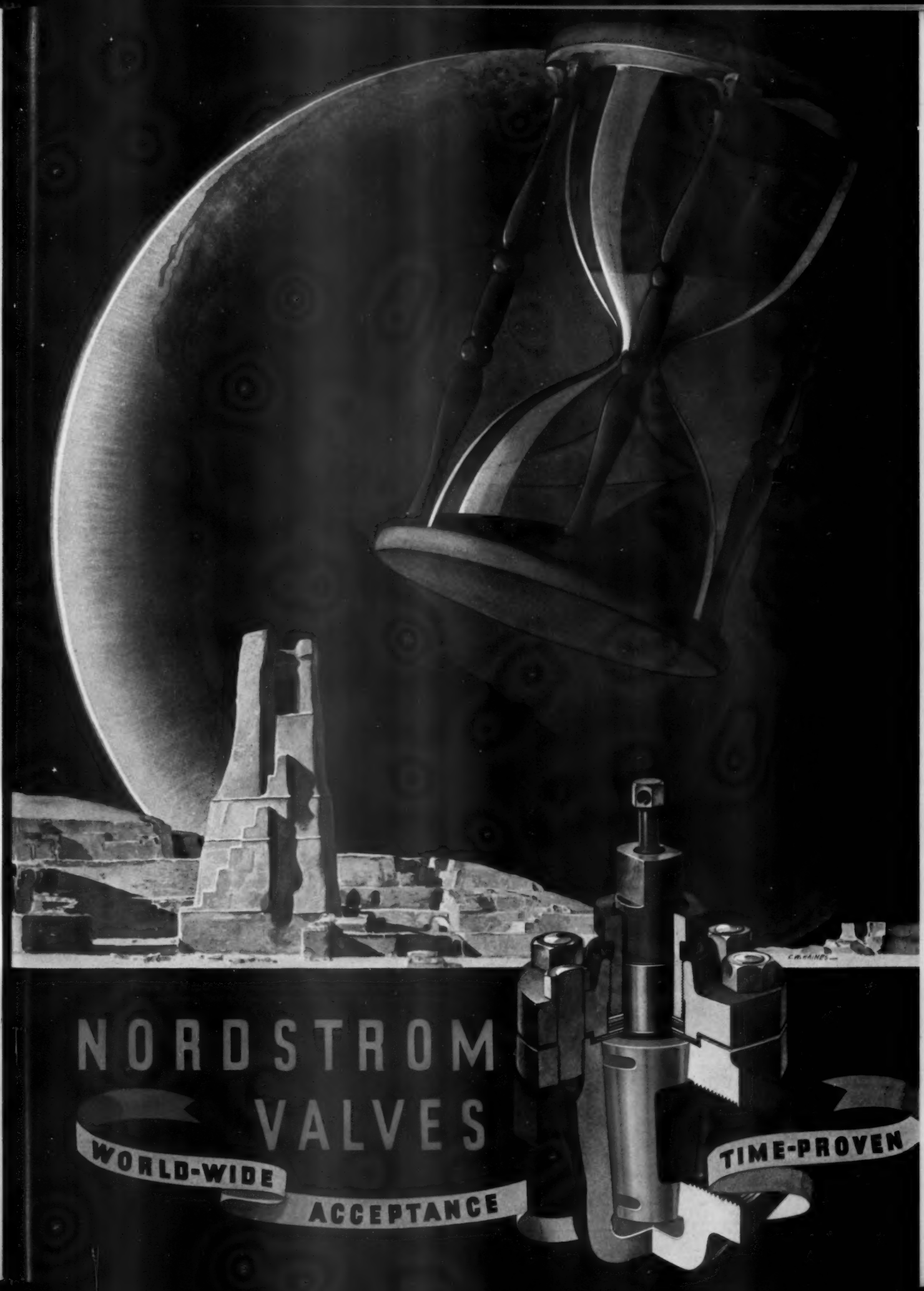
This property reports the installation of several copper services during 1933, for the purpose of studying the effects of soil and other conditions on copper pipe.

Company D.

This property reporting the use of copper pipe, states that copper pipe has been satisfactorily used for several years for drip connection to gas

(Continued on page 54)

* *Report of Subcommittee on Pipe Joints and Pipe Materials, presented at A. G. A. Distribution Conference, Memphis, Tenn., April 7, 1936.*


NORDSTROM
VALVES
WORLD-WIDE
ACCEPTANCE
TIME-PROVEN

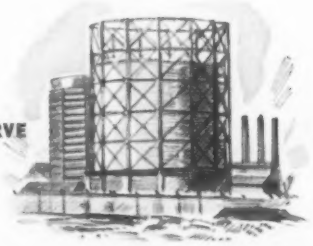
THE PERFECT APPLICATION OF A PRINCIPLE

NOTHING IS CONSTANT BUT

CHANGE

Time changes everything! Mountains erode; continents appear and disappear; the oldest known evidences of architecture yield. Time takes its toll — inevitably. Translated in modern perspective, consider the Gas Industry . . . . . Plants and equipment of yesterday are antiquated today. Economy of the past is present extravagance. Progress follows in the wake of change. *Valves* are a specific example. New operating demands exact higher levels of performance. Compounded pressures, extreme temperatures, factors of corrosion and countless other drastic conditions must be conquered. Nordstrom Engineers have envisioned these and future needs. They design ahead of contemporary progress. Nordstrom Lubricated Valves are a product of this vision. They have met, and will continue to meet, every challenge. In planning your *valve* installations and replacements, consider Nordstroms for *every* application. . . . . They shall *not* fail!

ONLY **NORDSTROMS** CAN SERVE



ALL MAJOR VALVE NEEDS

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NORDSTROM

LUBRICATED PLUG VALVES

PATENTED "SEALDPORT" LUBRICATION

Developments In Rental Purchase Plan In Rockford, Illinois*

H. S. Oyen
Central Illinois Elec. & Gas Co., Rockford, Ill.

IF YOU will go back with me to the late summer and early fall of 1933, we will find gas load and gas revenues continuing their decline. Merchandising of load building appliances for most companies was at a standstill. Extension of regular time payment plans was helping very little to move gas burning equipment. The situation was becoming quite serious.

Some unusual means had to be found to offset this continual decrease in gas output. We looked about for some plan or plans that would increase the sale of load building appliances and increase our gas load.

We had heard about certain rental plans being used in foreign countries. We had also heard that some utilities in this country were using rentals to popularize gas as fuel. But information regarding details, results, etc. were very scarce.

Because conditions warranted it, we decided to attempt the rental of automatic gas water heaters. A tentative plan was drawn up which included plumber dealer co-operation.

Some of the other features of the plan were as follows:

(1) We featured a 30 gallon Convertible Heater at $76.00, with a $1.00 down payment and $1.00 per month rental. Due to an increase in cost of heaters this was later changed to $85.00 with $1.00 down and $1.25 per month.

(2) The rental plan was available to any gas customer on our present gas mains, home owner and tenant alike.

(3) Customer was offered the use of the heater as long as he wished with the option to purchase at any time during the rental period. When rentals paid equalled the total rental price, the heater was to become his property.

(4) A 10% discount from rental price was to be allowed if heater was paid up at any time within first year, with all rentals paid applying on purchase.

After the first year a discount of 10% from unpaid balance was to be allowed, with all rentals applying on purchase price.

(5) The Gas Company, at its own expense, agreed to service all heaters during the rental period.

(6) The Gas Company agreed to move gas heater for tenant without charge if he moved. Connections to be made to an existing hot water system.

(7) A number of large capacity heaters were also offered on a rental basis. The rentals were somewhat higher. Payments were spread over a period of not more than five years.

So much for the details of our plan.

We then called in the Merchandising Committee of our local Master Plumbers' Association. We told them of our plans and asked them to participate with us. We offered to draw up an Agreement fair to both parties. They were a bit skeptical about our sincerity. Before that time all other Co-operative plans had fallen through for one reason or another. They reported to their organization and came back with a negative answer. We then called in their Board of Directors. They became sold on our plan and promised to sell the other members.

A regular Co-operative Agreement was drawn up and signed by 23 local Master Plumbers. Some of the high lights of this Agreement were:

(1) The installation of all Automatic Gas Water Heaters was to be turned over to those plumbers signing the Agreement.

(2) The Gas Company agreed to pay those plumbers who obtained customers that rented heaters, a bonus of $7.00 plus an installation allowance of $15.00 when heater was installed.

(3) When rental contract is taken by a Gas Company salesman without the assistance of a plumber, the installation will be assigned in rotation. A $15.00 installation allowance per heater will be paid on this type of rental contract.

(4) On rentals made by Gas Company salesmen to prospects turned in by Co-Operating Plumbers, a bonus of $7.00 per heater and an installation allowance of $15.00 per heater will be paid when heater is installed.

(5) The Gas Company agreed to give the same free service on heaters rented by the Plumbers as that rendered in the case of company rentals.

(6) The Company agreed to list the names of Co-Operating Master Plumbers in its advertising. If not listed, it agreed to use the caption "See Your Co-Operating Master Plumber or Ask any Employee of the Gas Company."

(7) The Gas Company to have available for the plumbers several salesmen. These men to be paid by the Company. (Incidentally, these salesmen were assigned to protected territories, and were given a salary and commission). The commission is the same for every heater installed in their territory whether a plumber rental or one they originate themselves. This has prevented any friction between plumbers and salesmen over sales. It has given plumbers the assistance needed in obtaining rental contracts.

(8) The Gas Company also agreed to furnish a heater for display in those shops that had showrooms suitable for display. Window displays were also furnished at regular intervals to tie in with the Company's windows.

(9) The contract could be terminated at any time, either by the Gas Company or Master Plumbers.

After signing of this agreement five salesmen were hired. They were given several days' training on the sale of Water Heaters, installation, etc. The Plumbers attended these meetings whenever possible during the day and were given special instructions at evening sessions.

The program started on October 17, 1933. The public was introduced to it by several large newspaper ads, which also contained the names of the Co-operating Master Plumbers.

Before giving you any results of

**Presented at the Mid-West Regional Gas Sales Conference, Chicago, Ill., Feb. 14, 1935.*

our rental plan, you should know a few facts about Rockford, Illinois, where this program was carried out.

Rockford is a city of 85,000 people, situated one hundred miles west of where you are now sitting. Contrary to regular belief, everyone living there is not Swedish. The speaker is of Norwegian descent if that means anything to you.

Its main products of manufacture are:

(1) Machine and Machine Tools
(2) Furniture
(3) Textiles

We, like all other strictly manufacturing cities, were hard hit by the late depression.

We have approximately 22,000 gas meters. Our water heating rate is $1.00 for the first therm per month, 20 cents a therm for the next 13 therms per month, and 14c a therm for all over 14 therms per month.

We have manufactured gas of 565 B.T.U. content. Our water is of 23 grains hardness, and is a problem to be considered in water heating.

Once under way, the program moved quite rapidly. About November 15, 1933 we set a quota of 200 heaters as a total for the year. We promised the Master Plumbers and our salesmen a real banquet if the quota was made. (Let me interject here to say that if you ever want increased activity from a group of plumbers, promise them a blow-out, because they really like them).

By Christmas we had our 200 heaters. Between the holidays we held our banquet. We don't know whether it was the Swedish food served or the other refreshments that caused the enthusiasm at this gathering. These dealers in their happy moments set their quota as a thousand heaters for 1934. We thought that was quite a chunk to bite off (even at a banquet) but we let them have it. This really did seem like a lot of heaters in view of the fact that 65 to 70 heaters had been a year's total prior to our rental program. We set up prizes contingent upon making of quotas, which certainly was a stimulus.

Before the end of 1934 this number was reached. Then many of them sat back and said we were through.

But our salesmen started right out again (they could do nothing else, their jobs depended on results) and in 1935 approximately 700 more were disposed of. To date we have gone over the 2000 mark. This is almost 10% of our meters. We have more than doubled our Automatic Gas Water Heater users.

Heaters at the present time are being rented at the rate of 50 per month.

You are probably wondering about reverts, the moving of tenants, heaters, delinquents, etc.

Our reverts are running about 10% for all causes. This figure includes those removals due to rental customers moving into apartments and flats where hot water is furnished by the owner. Whenever a heater is left in a home, due to the original renter moving out and not having heater moved with him, we keep watch on this empty home through our application department. When application for service is made, we immediately contact new tenant to see if he will give us contract for balance of heater. If he refuses to take over rented heater, we remove it and credit original renter's account.

In speaking of reverts, it may be interesting to note that most reverts due to operating costs occur within the first three or four months. After a heater has been in use for six months, it is pretty sure to stick. The reason for this we believe, is that the customer after enjoying the benefits of automatic hot water service by gas is willing to pay the small monthly rental plus the additional cost of gas used.

The number of heaters moved without charge has been small.

Our rental program has been in operation almost 2½ years. Our delinquent rentals are less than ½ of 1%. We have been very insistent about keeping rental payments up to date, trying not to let the customer ever get more than four months in arrears. If he does, we either collect the rentals or remove the heater. Cases of removal for non-payment of rentals are rare.

We have made only one attempt to call on our rental customers to see if they would be interested in taking up the heater and receive their discount. This attempt was not very successful. Some signified their intentions of so doing when economic conditions became better. But most of them seemed satisfied to continue on the rental basis.

A number of customers on their own initiative have taken advantage of their discount, and paid for the heater within the first year. Some have also purchased heaters outright on the cash basis.

In studying the increase in consumption due to a new automatic water heater installation, we find the average increase runs about 2000 M.C.F. per month, or 24,000 M.C.F. annually. For water heater users our gas will average a little over $1.00 per M. C. F. which means an annual increase in gross income of approximately $24.00 for each customer that has a rental water heater installed in his home.

The installation of 2000 automatic gas water heaters has meant a considerable increase in revenue at a time when it was badly needed.

In addition, it has educated a large number of customers to the use of the finest automatic hot water service known—that furnished by gas—which in time will lend a helping hand in educating a large number of others to its use.

It has also stifled the promotion and use of other competitive fuels for automatic hot water service.

The rental plan, through its cooperative nature here in Rockford, has also built up a friendly relationship between our plumber-dealers and the Gas Company, which we feel will be of mutual benefit to all concerned for years to come.

Pipe Line to Detroit

The Michigan Gas Transmission Company of the Columbia Gas & Electric Corporation's System has commenced construction of approximately 230 miles of 22-inch high pressure pipe line from Zionsville, Indiana, direct to the River Rouge plant of the Detroit City Gas Company. This construction is an outgrowth of a contract entered into by the latter company last fall for the purchase of natural gas, which it is reported will be distributed to that company's consumers in Detroit.

The new pipe line will connect with Columbia's Indiana line about 12 miles north of Indianapolis. Natural gas from Texas is supplied to the existing system in Indiana by the Panhandle Eastern Pine Line Company at the Illinois-Indiana State line.

Building of this new pipe line involves the laying of some 50,000 tons of steel pipe, the construction of several manifolded river crossings, the erection of at least one booster station in Indiana and provision for a pressure regulating and metering station at the Detroit terminal. Both welded and coupled construction will be employed. 12,000 Dresser couplings will be used.

It is estimated that this new line will be completed and ready to supply natural gas to Detroit some time in the coming summer.

Because of the added demand to be put upon its system by this new pipe line, the Panhandle Eastern Pipe Line Company of Kansas City is reinforcing its 1,000 mile system by the installation of approximately 20,000 horse power in reciprocating-compressor, booster stations this year.

When completed, these combined projects will constitute the longest natural gas transmission in the world.

Effective Methods Of Handling Test And Trial Installations*

F. B. Jones
Director, Industrial Gas Sales
Equitable Gas Company, Pittsburgh, Penna.

THE wording of this subject for discussion suggests or implies that I believe in the use of trial installations as an important part of gas company policy to acquire or hold industrial gas loads. I hasten to add, however, that I believe in only those installations that are carefully sold, engineered, and installed. My remarks will be based on this point of view.

Before I describe in more detail my views on this subject, I think it is desirable and necessary to define what I mean by "test or trial installations." For the purpose of this discussion, I am considering that the terms "test" and "trial" are practically synonymous. I am also considering that in most such installations either term could be applied to the same installation and the choice of the particular term on a particular job would depend largely on one's point of view. Thus, by a trial or test installation, I mean a job where the use of gas is put on trial or "weighed in the balance" as the case may be, and the gas company assumes a monetary risk if the job fails to operate satisfactorily.

My remarks also will apply to cases where an existing use of gas is threatened and the gas company is trying to save the load, and of course, to cases where the gas company seeks to add new load to its lines.

Having the above definition or description of a test or trial industrial gas application in mind, we might properly discuss the desirability of a gas company's using such installations. A number of questions must immediately arise in the mind of any gas company executive when considering such a procedure.

1. Why is it necessary to use such procedure to save or obtain industrial gas loads?
2. Are our salesmen using test or trial installations as a substitute for salesmanship?
3. Why won't the industrial equipment manufacturers take the risk on such jobs? Don't they sell the equipment for these jobs?
4. Why won't the industrial customer take his own chances in applications of gas if such applications are supposed to save him money, time, or improve his product?
5. Why can't the A.G.A. take the risk on equipment, materials, or time to save or obtain industrial load on our lines, since we are company members?

It is my guess that most gas company executives have at some time or other had some or all of these questions run through their minds, when their industrial men proposed trial installations. I cannot take the time to fully discuss all of these questions but some arguments should be given in order to justify my position that "limited and careful use of trial industrial gas installations is justified."

In the first place, the consuming public in general, including housewives, individuals, and the *men* in the industrial plants to whom we must sell industrial gas, have been taught by other merchandisers of services and equipment to expect proved or guaranteed performance in a piece of equipment or apparatus that they contemplate buying. For example, the vacuum cleaner people freely place a vacuum cleaner in homes to demonstrate its effectiveness and improvements over the old machine; the radio people will usually install a new type of radio in your home so that you may test its tone quality and station-getting power; the automobile people will put a new car in the hands of the very *man*, possibly, (industrial executive), to whom we may be trying to sell industrial gas, to operate and test its performance. . . .

The question that may be properly raised at this point is whether it would not be better to install an industrial gas job on a guaranteed performance basis than make a trial installation. My contention is that the guaranteed performance of an industrial gas job is nothing other than a trial installation. Obviously, if the installation does not come up to the guarantee it will have to be removed or altered.

Another argument that might be advanced to justify the use of a trial installation is that it tends to lower sales resistance and hastens the acquisition of a new load, particularly in a plant where gas is not widely used or where the management is not particularly familiar with the applications of industrial gas and its results. In such plants, we have found from experience that a preliminary successful trial installation is often useful in obtaining the management's confidence in our ability to recommend and design proper industrial gas heating installations for his plant and thereby helps to get the load on the gas company's lines much more easily than would be possible if our industrial gas salesman resorted to pure salesmanship alone, not combined with a demonstration and proved performance. . . .

Now, having given some of the arguments to justify the use of trial installations, let us turn our attention to the proper way to handle such installations if beneficial and lasting results for the gas company and the gas industry are to be achieved. When I think of the use of trial installations from this point of view, some of the first things that come to my mind are several "don'ts."

First, we should be on our guard to avoid using a trial installation as a substitute for good salesmanship.

Second, we should try to avoid making a trial installation on a particular application that is similar or somewhat parallel to another installation in the same territory. If there is such another installation our prospective customer should be shown the parallel installation and an attempt should be made to sell on that basis. My thought is that if we could show a prospective customer that a parallel installation is satisfactorily and economically being

* *Presented at Industrial Gas Sales Conference, Detroit, Mich., March 10, 1936*

done with gas and he still insists on a trial installation on his own premises, then I would class such demand as unreasonable or else I would wonder if our salesmanship were not at fault.

Third, don't make a trial installation on a job from which the revenue is insufficient to justify the effort, time, and expense. Many times have industrial gas men wasted their time in trying to work out some difficult and intriguing heating problem that, in the end, if successful, only amounted to a few thousand cubic feet of gas per month to the company. As an example, I will call attention to the time that might be spent in developing and trying natural gas on cutting torches in natural gas territories. In our case, for instance, if we had all of the metal cutting torches in the whole territory using our gas, I question seriously whether the additional gross revenue would pay the monthly local traveling expenses of our industrial gas salesmen.

After we have applied some or all of the above yardsticks to a proposed trial installation, the engineering phase of the gas application should be carefully investigated and worked out. Of course, some gas companies are so organized that they have separate groups of men to handle the two phases of a proposed installation. One group would handle the contact and selling work with the customer, while a second group might take care of the mechanical and engineering features of the installation. In other companies, we find that one man may handle the whole job from the initial contacting of the customer to the final adjustment and operation of the equipment. . . .

While the industrial engineer, if such a man is available in the particular gas company, is preparing his engineering study and analysis of the heating job, the industrial salesman should not be idle and should be contacting his prospect's personnel, including everybody from the plant manager down to the furnace operator, to sell them on the idea of using gas and creating in their minds a desire to make gas satisfactory. In general, if all of the other factors of a proposed trial installation were properly worked out and favorable, and the plant personnel still were antagonistic or adopted a "show me if you think you can" attitude, I would hesitate to proceed with such a trial installation until that attitude was corrected. Sometimes, a delay of a few months or a few weeks, when such an attitude exists, is sufficient to develop a more friendly and cooperative attitude on the part of the plant personnel.

To summarize, we can list some of the things that should be done, up to the time the decision is reached to go ahead with the installation.

1. The particular heating operation must be important to the customer.
2. The potential or existing gas load must be worthwhile to the gas company.
3. A thorough analysis of the customer's requirements must be made and the gas company representatives should be convinced that gas can give such requirements.
4. Your own territory or immediate territory should be investigated to see if a parallel installation could be found.
5. The most economical equipment and design for the gas application should be selected, consistent with the customer's requirements.
6. The customer's entire personnel should be favorable towards gas and willing to give it a fair trial.
7. The customer's commitment, preferably in writing, should be secured to pay a definite price for the installation if the performance guarantees are met.

If all of these matters have been investigated and conditions are favorable, the next step should be to order the necessary equipment and to make the changeover to gas. I would like to strongly emphasize the importance of having some gas company representative to be personally delegated to supervise the actual installation. Usually when a trial installation is made no one in the customer's plant can be relied upon to take the necessary personal responsibility to see that the installation is made as planned. . . .

Examples of Successful Trial Installations

No. 1: 17-42" Schwartz Brass Furnaces Now Using Gas, Fired with Premix Blower & Burners.

This customer has used gas for melting various brass mixtures for years. Their specifications gradually tightened and one day we found they were dissatisfied with gas on account of a high percentage of rejects and metal loss. They were considering a change of fuels and using a different type of furnace. We proposed a trial installation consisting of a constant pressure blower, McKee proportional mixer, tunnel burners, and simplified piping on one furnace. Risk to us was about $550.00.

The installation was successful. Melting loss was reduced from 2½% to less than 1%. Casting rejects were practically eliminated as compared to 30% formerly. Fuel consumption was reduced 30% to an average of 1.5 cubic feet per pound. Melting time was reduced from 50 minutes to 25 minutes per heat. The customer purchased the trial equipment for the first furnace and later similarly equipped five more. Eventually the customer may equip the remaining furnaces, depending on production requirements. All out-of-pocket costs on this job were recovered.

No. 2: Five Large Forging Furnaces for Making Steel Car Wheels and Locomotive Tires.

These furnaces were fired with combination oil and gas burners, with the choice of fuels somewhat depending on the oil market. The potential economy and advantages of natural gas were not being realized on the job. A trial installation of 13 proportioning velocity burners with tunnels, plus two smoke burners, plus changes in flue arrangement, was proposed, involving a risk of $450.00.

The job was successful; the actual fuel cost with gas at $0.30 per M cubic feet was definitely shown to be lower than with 3¼c oil at the furnace, but the inherent advantages of straight gas burners, such as speed of heating, ease of furnace temperature control, elimination of danger of burning the steel, and reduced scaling, made the cost of fuel distinctly secondary.

The customer purchased the gas burner equipment and is now planning to equip the remaining four furnaces with similar equipment.

Examples of Unsuccessful Trial Installations

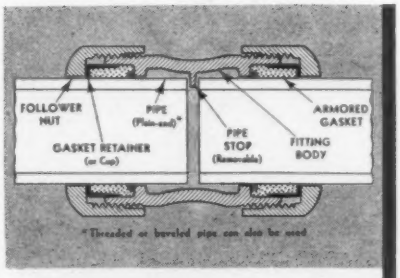
No. 1: Air Drawing for Pneumatic Tools.

A circular furnace about 4' in diameter, fired with blast tips on vertical manifolds surrounding a wire basket, was designed and built by a local fabricator to give a temperature uniformity not varying more than 5 degrees F plus or minus. The risk involved was $400.00.

The furnace was built, installed and tested. It gave the guaranteed performance. Customer used it for about four months and then began to find fault with its performance. Investigation showed the customer was anticipating a large order for the type of tools the furnace was de-

(Continued on page 40)

Compact! Self-Contained!



HOW THE DRESSER "65" WORKS

● Two *Threaded Follower Nuts,* when screwed up on the *Fitting Body,* compress an *Armored Gasket* tightly around the *Plain-End Pipe* with tremendous force, giving a positive seal under all conditions. A *Gasket Retainer* (or Cup) acts as a housing for, and protects, each gasket. On the inside of the Fitting, a *Pipe Stop* centers the pipe-ends inside the Fitting; this stop may be easily knocked out to slide the Fitting along the pipe like a sleeve (for repair work, etc.).

The above coupling is from the new and complete line of Dresser Compression Fittings, now available. Installation is remarkably simple. Just slip the pipe-ends into the Fitting (which comes assembled) and then tighten! Result—a positive seal, *absolutely tight.* Plain-end pipe is used (threaded or beveled pipe is suitable, too).

The Dresser *flexible* "floating grip" absorbs pipe movements and stresses; permits pipe deflections. The new Compression Fittings come in sizes ⅜" to 2" I.D. and include standard and extra-length Couplings, 45° and 90° Ells, Tees, etc. *Write for Folder No. 361.*

S. R. DRESSER MANUFACTURING CO., BRADFORD, PA.

In Canada: Dresser Mfg. Company, Ltd., 32 Front St., West, Toronto, Ont.

DRESSER *COMPRESSION* FITTINGS *Style 65*

Infant Copy . . . . . for Effective Window Displays

by Stuart Bratesman
Manager, Display Dept.
Boston Consolidated Gas Co.

"OUT of the mouths of babes . . ." comes more than wisdom. You can use the universal appeal of a baby for promoting sales and goodwill, in your window displays.

Everyone will admit the value, and instant arresting quality, of a chubby infant in advertising. Here are two ideas designed to sell the service of the silent air-cooled gas refrigerator. Needless to say, they did a bang-up job for the company using them. National advertisers use photographs of babies, to a great extent, and there is certainly a realistic appeal in this type of illustration, but poster window displays should have the infants painted in heroic proportions, to carry through the massive qualities displays give the passersby.

Copy can be written as conversational, first-person, as in the case of the yawning youngster, or in a more educational and institutional manner, like the other display shown with these lines. Both have their place. The sleepy tot idea directly focuses the attention on the silence of the gas refrigerator, without reading a single word. This point is always effective in selling gas refrigeration. The health idea of fresh foods, through the years, is a good angle on long life, too.

Did you ever stop to consider the actual value of your window spaces? By that, I mean their sales and educational worth to your company. For example, take the outdoor billboards in your own community. They represent effective space sold to advertisers. The figures on a mere two weeks rental of that space will amaze you. Your own windows are somewhat the same as these outdoor spaces. They get what is called a potential sales coverage from the people who daily pass your store. If you are situated on a busy thoroughfare, they are all the more valuable.

And just remember, they cost you nothing more than your rent, or taxes. Free advertising space, right in your own store. Are you using it to best advantage? This spring and summer would be a good time to begin reaping the benefits of intelligent display advertising. You don't necessarily have to have an elaborate display staff, if your budget and number of window locations prohibit it. Have a local display or sign house prepare simple displays from the ideas set down in these articles each month. They're yours for the taking.

Start the ball rolling with these two infant thoughts. Window displays bring in sales, at low cost!

Demonstrations by Six Year Old Prove Simplicity of Operation of Modern Gas Range

By Lucius S. Flint

THE simplicity of the modern gas range is being brought to the attention of Denver housewives in a striking way through a series of cooking demonstrations given at the Public Service Co. of Colorado by a six year old child, Barbara Jenkins.

Rivaling in charm and personality, moviedom's outstanding child personages, this remarkable youngster, a discovery of the Public Service Co. advertising department, demonstrates a truly amazing ability to cook. She can prepare more than 100 dishes in a way sure to tempt the most particular appetite. That ability, combined with the ease of operation and convenience of the company's featured gas range, has made possible a really attention-arresting demonstration program.

Some idea of the interest she is creating may be had from the fact that more than 1,500 people attended her first two half-hour demonstrations. She will be seen daily by thousands of people in a coming appearance at a local cooking school.

The Public Service Co. had a three-fold purpose in introducing the child. First, to illustrate the ease of operation of this range—"so simple a child can operate it" becomes a factual statement. Second, to build a large following of children and through them gain the interest and good will of their mothers. Third, to gain deserved recognition for a really talented Colorado girl.

The demonstrations have been managed with a great deal of care and good judgment. No attempt has been made to set the child up as an instructor—or even an example—for adults. The sole appeal has been made to children and indirectly to their mothers through interest in the youngsters.

Wholly unassisted, little Barbara puts on a 35 minute cooking demonstration in the utility's main floor display window each Saturday morning and afternoon. Using a microphone and loudspeaker arrangement, she broadcasts as she goes along, explaining how she is using the equipment and what she is doing in preparing the various foods. Her outstanding ability to speak in public, her exceptional personality and a very evident thorough knowledge of cooking—all combine to absolutely startle observers.

In her first two demonstrations, Barbara prepared a balanced breakfast, including baked biscuits, broiled bacon and boiled eggs served on toast with white sauce and a glass of tomato juice. In later demonstrations, she will cook other complete meals including many of her 100 dishes.

Child Cooking Club

Built around the child, the company has inaugurated a youth movement among girls from six to 12 years of age, the Barbara Jenkins Cooking Club. It has already attracted widespread attention. More than 300 children registered on the first day and more than a score of letters of application have come in from all over Colorado and several nearby states.

To enter the club, a child has to turn in a coupon clipped from the original newspaper advertisement announcing the demonstration. The slip gives the child's name and ad-

Bring "Little Sister" to See
Barbara Jenkins, Age 6
Who Cooks like a grown-up
COOKS, BAKES and BROILS
Two Special Demonstrations
Main Floor, Corner Window
Present this Coupon at either demonstration
FREE COOK BOOK for children
Public Service Company of Colorado

dress and age, and make and age of her mother's gas range. The latter information, is, of course, valuable for sales follow-up usage.

When presenting the coupon, the child receives a 28 page cook-book for children, an autographed picture of Barbara Jenkins, an illustrated booklet telling about the modern gas range and a questionnaire or examination sheet. A unique feature of the cook book is its particular application to children. The different measurements are all illustrated pictorially. If a cup of milk is called for, a cup of milk is shown, if a teaspoon of butter, this is illustrated and so on.

There are eight questions on the examination sheet. To answer them, the child must be familiar with the features of the range and use the cook book. One of the questions provides an effective tie-in with dealers. It is "Name four dealers in Denver who handle modern gas ranges". At the same time the child turns in the questionnaire, she is asked to submit an original recipe for exchange with other members.

On turning in the completed questionnaires, club members are given Awards of Merit and a Barbara Jenkins Cooking Club ring bearing the club emblem—crossed arrows, signifying Friendship.

Interest in the club will be kept alive through recipe exchanges and radio broadcasts. The tentative plan is to have the children themselves appear on the air, something that is sure to appeal to mothers who nearly always like to have their children in the limelight.

Original advertising consisted of a one-day, four column by 15 inch newspaper advertisement and six spot announcements over a local radio station. The principal follow-up will be via radio. The first newspaper ad featured cuts of Barbara cooking and of the cook book offered. The coupon appeared at the bottom of the ad.

Barbara's Background

The daughter of an outstanding cooking instructor who is responsible for her youthful culinary skill, Barbara is otherwise an ordinary child. She is in the first grade in a Denver public school and is a good student and well liked by the other children.

Effective Methods of Handling Test and Trial Installations

(Continued from page 36)

signed to draw but failed to get such order. He then refused to pay for the furnace, pointing to imaginary defects and complaints. The furnace was removed.

Conclusion: This installation was made without first determining that the customer had a real need for it. Thus our trial installation fund suffered a loss.

No. 2: 40 Tin Coating Pots Fired with Cleaned Producer Gas.

A thorough analysis of the thermal problems was made. It was estimated that the existing pots could be fired with external high pressure velocity natural gas burners, and give a substantial saving in fuel costs, time, and pot maintenance. An installation of burners, piping, thermostats, and gas compressor was made on one pot.

The performance of the burner set-up was satisfactory. Fuel costs were shown to be lower than with the cleaned producer gas, but the customer hesitated to change the 40 pots over to natural gas. They found many objections, such as (a) eliminating the cleaned producer gas would not lower their producer gas costs because they had other operations using producer gas and thus required a producer operating crew; (b) they were afraid they could not depend on the supply of natural gas; (c) a change-over of fuels might upset their operations and thus cause a loss in production quality, etc., costing more than gas would save; (d) they may in the near future change the layout of their plant.

Sufficient to say the installation has not yet been made and our burner equipment, compressor, etc., were removed.

Conclusion: The customer's personnel was not favorable to natural gas operation. Possibly our preliminary salesmanship was not adequate.

W. M. Couzens Rejoins Laboratories' Staff After 2½ Years in Field

Resigning his position as Eastern Manager for Grayson Heat Controls, Limited, manufacturers of thermostatic and clock control equipment for gas appliances, Mr. W. M. Couzens rejoined the staff of the American Gas Association Testing Laboratories in Cleveland on March 1, 1936, in the capacity of Assistant Chief Engineer. Prior to December, 1933, Mr. Couzens had served with the Laboratories for a period of over 7 years during which time he was engaged in various capacities including those as Supervisor of the Pacific Coast Branch Laboratories and as head of the Research Department of the Cleveland organization.

Starting as a testing engineer in 1926 at the Cleveland Laboratory, after graduating from Tri-State College, Angola, Indiana, Mr. Couzens was soon assigned to research work, principally in the field of gas mixing, and in 1928 was appointed Chief Inspector. In 1930 he was chosen to organize the first branch Laboratory in Los Angeles. Based upon the fruits of his organizing efforts, the Pacific Coast Branch of the American Gas Association has since flourished to a position of great importance to the American gas industry. In February, 1933, Mr. Couzens exchanged posts with Dr. F. E. Vandaveer, Supervisor, and returned to the Cleveland institution to manage research activities. His service with the Grayson organization began in December, 1933.

As Assistant Chief Engineer, Mr. Couzens will work with Mr. K. R. Knapp in managing testing activities in Cleveland.

Portland Stove Foundry Co. Recruits Leighton from Laboratories

James A. Leighton, American Gas Association Laboratories engineer since June, 1930, will take up general duties with the Portland Stove Foundry Company, Portland, Maine, on May 1, 1936.

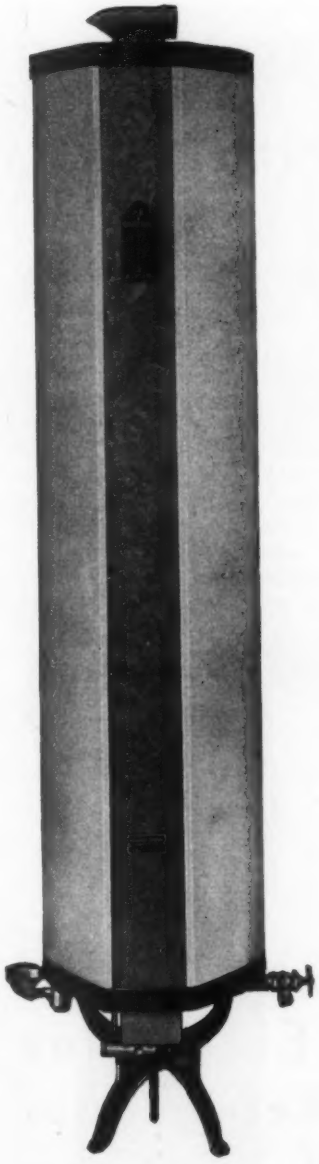
During his six years with the Cleveland Testing Laboratory, Mr. Leighton has served as testing engineer, inspector, research engineer, and in the Publications Department as acting secretary for the various requirements committee. Recently he has been acting as assistant to Mr. F. O. Suffron, head of the Research Department of the Laboratories.

Mr. Leighton is a graduate of Massachusetts Institute of Technology and holds his degree in the field of engineering administration.

(Continued from page 29)

regions affected there were newspaper editorials praising the work of the utilities; and public officials, hospitals and manufacturing plants sent letters of appreciation. In other industries a record such as ours might well have been broadcast from coast to coast. To us it is merely another episode in carrying out our tradition of unfailing service.

Think back over past emergencies. There have been many of them—flood, fire, tornado, hurricane, earthquake. In every single case that we know of or have ever heard of the gas executives and the employes of the industry have gone beyond the requirements of duty. They have sought no glory on such occasions, but only that the public should have confidence in them and in the service which it takes so for granted even during times of public catastrophe. We may justly feel proud of the part on industry played in minimizing human suffering during the flood of 1936, just as it has always done on similar occasions.



Now!—Handley-Brown Scores Again! . . . .

MIRRO-SHELL

A REVOLUTIONARY GAS WATER HEATING METHOD THAT MAKES AN AUTOMATIC STORAGE WATER HEATER OUT OF THE OLD RANGE BOILER

●

Now Brought Out in a New Size for

40-GALLON RANGE BOILERS

The Mirro-Shell method of heating water was introduced less than a year ago and Mirro-Shells for 30 gallon range boilers are now sold by more than 100 gas companies and many dealers. The grand success gas companies, dealers, and users have had with Mirro-Shell made them want the same type conversion unit for 14" x 60"—40 gallon range boilers. Here now are highly efficient, most attractive appearing heaters for the whole conversion field.

Complete all in one unit combining heating element and insulation at low cost.

Can be quickly installed by one man.

Condensation completely eliminated.

No circulating troubles, circulation achieved through natural law; no mechanical controls needed.

Equals factory built job in appearance and efficiency.

No liming, no sediment troubles.

Low-pressure regulator, thermostat and safety pilot standard equipment.

No water connections needed for installation.

Attractive Morocco finish on 24-gauge steel jacket.

Model M.S.-40-5-A for 14" x 60"—40 gallon Range Boilers with an input of 5500 B.T.U. per hour will supply up to 120 gallons of 90 degree rise hot water per household day.

Model M.S.-30-4-A for 12" x 60"—30 gallon Range Boilers with an input of 4500 B.T.U. per hour will supply up to 85 gallons of 90 degree rise hot water per household day.

For complete details, prices, terms—Write

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN

Developers and Pioneers of the Low-input Gas Water Heater

Over 32,000 Came—Guessed and Went Away Talking Gas Refrigeration

By Howard C. Minnich

Assistant Advertising Manager, The Ohio Fuel Gas Company

A YEAR ago the New Business department of The Ohio Fuel Gas Company tried out a new plan for promoting interest in and creating prospects for Electrolux gas refrigerators.

In short, the plan was this: A gas refrigerator was placed on the display floor of the company's office and connected to a gas meter at its side. At a specified time the face of the meter was sealed in the presence of civic leaders. Customers, coming into the office, were invited to open and inspect the refrigerator under test and to guess how much gas it would use in a specified period of time. On the guessing card the customer was asked to answer certain questions which would determine whether or not he was a prospect for a new refrigerator. At the end of six weeks the seal on the meter was broken and the reading taken. The person guessing closest to the amount of gas used was given the refrigerator used in the demonstration.

Last year the plan was tried in two test cities. Springfield, a city of 17,000 meters, and Toledo, a city of 72,000 meters, were chosen as the proving grounds.

The two tests were conducted during February and March, just prior to the Electrolux sales campaign, which started in April. In each case the cost of operating the gas refrigerator was well under 3 cents a day, even though the doors were opened many thousands of times. The contest drew many more replies in Springfield than in Toledo for the amount expended in promotion. From this it was concluded that a prize of this value will create much greater interest in smaller cities because the customer feels his chances of winning are greater.

Oddly enough, an employe of the electric company won the 1935 contest in Springfield and was presented with a gas refrigerator. A very complimentary statement was received from him and publicized.

As a result of these contests, our salesmen in the two test cities started the 1935 season with a large list of good prospects and a still larger list of likely suspects. They followed up this list with a call at the prospect's home and used the message of the contest results as a most effective entree.

This year, in view of these experiences, it was decided to conduct a similar contest in eight key cities of our operating territory, omitting Columbus and Toledo, the two metropolitan areas. Inasmuch as the refrigerator campaign was moved ahead one month this year and was to open March 1, the contests were started five weeks prior to this date, January 25, and ended February 29.

A large newspaper advertisement, announcing the contest and giving the rules, was run in each of the eight cities. Handbills similar to the newspaper ad were given liberal distribution. Newspapers in practically all the cities ran news stories on the event and many ran photographs of the sealing of the meter.

In the eight cities 32,178 guesses

(Continued on page 52)

This Electrolux Gas Refrigerator FREE If You Guess How Much Gas It Uses

WE'VE been telling you that gas refrigeration costs less than 3 cents a day and thousands of housewives have proved it to their own satisfaction. Now we want to prove our claims publicly to you by operating an Electrolux gas refrigerator with the connecting meter sealed. To enliven interest in this demonstration we will offer this refrigerator ABSOLUTELY FREE to the person giving the nearest guess of the amount of gas it will use.

Tomorrow morning at 10 o'clock the meter will be read and sealed in the presence of civic leaders and the general public at The Gas Company display room. Then will follow five weeks of heavy duty operation such as no refrigerator would be called upon to perform in any home. Thousands of people will examine this Electrolux gas refrigerator while it is under test. On Saturday, February 29, the seal will be broken at 10 A. M. and a second reading will be made. It costs you nothing to guess how much gas the refrigerator will use in the five weeks. Follow the easy rules at the right and enter this free contest.

You are invited to witness the sealing of the gas meter which starts this contest Saturday, January 25, at 10 A. M., on the display floor of The Gas Company

The Gas Company

Nothing To Buy
Nothing To Sell
Just Follow These Easy Contest Rules

1. Contest is open to all living in city where contest is conducted or in any other city served by the Company out of the same district office, excepting employes of The Gas Company and members of their immediate families.
2. Entrants are limited to one guess each, though each member of a family may submit an answer.
3. All guesses must be submitted on a blank obtainable at The Gas Company, and completely filled in with the required information. No purchase is necessary.
4. Entries in the contest will be received after 10 A. M., Saturday, January 25, and until 10 A. M., Saturday, February 29, at the office of The Gas Company where the test is conducted.
5. The 1936 Electrolux Gas Refrigerator used in the contest will be installed free in the home of the contestant who guesses the closest to the number of cubic feet or fractions of cubic feet of gas that will be used by the refrigerator in 7 weeks.
6. In case of two or more contestants living in submitting the winning answer, the refrigerator will be placed on a 48-hour test with the door closed, and those awarded to the closest winner guessing closest to the amount of gas used in the 48-hour period.

Gas Doesn't Cost . . . . . It PAYS!

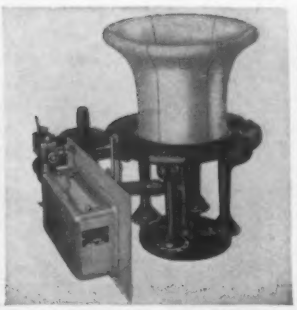
Show the line and Reap the Profit

You can please *every* customer when you show the complete line of American Gas Products for heating. There's a boiler or a convertor to suit every taste, every home, every job. For the man who wants a completely new installation — the Ideal Gas Fired Boiler, in whichever of its many sizes suits his requirements. For the man who wants a conversion burner, you've got the convertor tailored to his needs. Here is the line—show it and profit. Each is dependable, efficient, economical to operate. Each is fully automatic, all controls being centered in the AGP Throttling Gas Valve. Each is an item that's easily sold and that *stays* sold. For full particulars and details write today to

AMERICAN GAS PRODUCTS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
40 WEST 40TH STREET · NEW YORK, N.Y.

HERE'S THE ANSWER TO EVERY GAS HEATING REQUIREMENT:

REDFLASH GAS CONVERTOR—Tailor made for the No. 1 series of Arco Redflash and similar boilers.



AMERICAN GAS CONVERTOR combines features never before incorporated as standard equipment in a burner. For Round Boilers.

IDEAL GAS-FIRED BOILER—From the smallest to the world's largest, provide a size and type for every domestic and industrial need.

"EMPIRE" IDEAL—The world's most beautiful gas boiler. No exposed piping; even flue pipe and header in some models come out at the back. All sizes and types.

News of the Industry

Gas Plant Is Destroyed By Tornado, But Operation Suspended Only 2 Days

At 10:05 o'clock a.m., Monday, April 6, a tornado cloud sweeping eastward from Gainesville, Georgia, struck Anderson, South Carolina, carving a wide path of destruction and leveling to the ground the plant of the Anderson Gas Company.

Fifty-four hours later, at 3 o'clock in the afternoon of Wednesday, April 8, gas service was resumed in Anderson.

Although gas-manufacturing machinery stood in the open without so much as a shingle of shelter, surrounded by piles of crumbled bricks which once were walls, it coped efficiently with the emergency, supplying a tornado-torn city with an essential and warmly-welcomed service.

Gas was actually lacking in Anderson only 50 hours, as supply tanks did not become exhausted until 12 o'clock noon, April 6. During the brief period of suspension, hospitals were supplied ample gas from tubes.

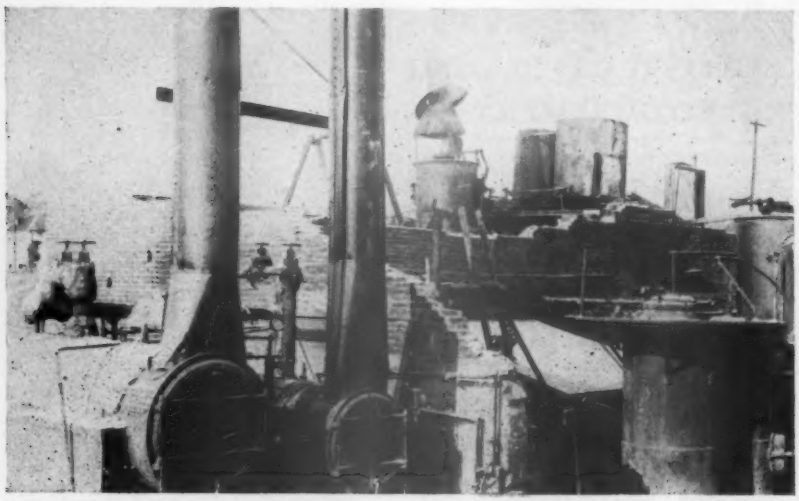
Crews of specialists were rushed to Anderson from Sumter, Columbia, Augusta and Greenwood. Even before they arrived, laborers were engaged in clearing debris from machinery.

By Monday midnight, in spite of torrential rains, wreckage had been piled to one side, permitting an inspection of machinery. It was found that some of the apparatus was badly damaged by falling walls, but not beyond repair.

Tuesday was spent in putting machinery in order, and early Wednesday morning the manufacture of gas was begun.

After informing gas users by radio and through the newspapers of safety measures, gas was turned into the mains at 3 o'clock in the afternoon of Wednesday, April 8. Everything worked perfectly; not a single "incident" marred the procedure.

No one was injured in the collapse of the gas plant. Workers saw the tornado bearing down upon them and rushed out into the open, where they flattened themselves on the ground. One man, Allan Jeffords, a gas maker, failed to make the door. Brick walls crashed down on all sides, but he escaped without a scratch.



Anderson Gas Company plant as it appeared when operations were resumed.

Southern Counties Gas Co. Twenty-five Years Old

Celebrating the twenty-fifth anniversary of the organization of Southern Counties Gas Company, Los Angeles, Calif., thirty-two members of the concern honored Ferdinand R. Bain, founder and present chairman of the Board with a "Silver Anniversary Dinner" at the Biltmore Hotel Monday evening. Leroy M. Edwards, general counsel, acted as toastmaster.

Southern Counties Gas Company was organized by Mr. Bain in 1911, at which time the company's product was wholly manufactured gas, distributed to about 3,000 customers. Today the company serves 154,970 customers with natural gas from mains connected with practically all the gas producing oil fields in California.

Beginning in 11 small communities in Los Angeles and Orange counties with the service of manufactured gas from 7 small plants, the system now extends through five counties and serves more than 70 communities, including Santa Barbara, Ventura, Pomona, Whittier, Santa Ana, Venice and Santa Monica through 3,692 miles of transmission facilities.

As an interesting sidelight, records of the company disclose that transportation equipment in 1911 consisted of one horse and wagon, with one or two motorcycles and a few bicycles. Today a fleet of 380 automobiles and trucks is required to maintain service to present customers.

Automatic Gas House Heating Costs Featured at Dinner Meeting

More than three hundred plumbers and gas appliance dealers attended a special dinner meeting held by the Consolidated Edison Company of New York, Inc., in the company building at 4 Irving Place on April 16.

Representatives of all of the important plumbing and heating concerns in the territory served were present.

The feature of the session was a dramatic blackboard presentation of the cost of automatic house heating by gas. The audience of plumbers and dealers supplied their own figures in working out the difference in cost of heating a house by oil, coal, and gas. This part of the program was conducted by Robert A. Lawder, who was recently appointed Sales Promotion Manager of the company.

George Ostlund, General Sales Manager, acted as chairman of the meeting. He outlined to the plumbers the potential gas heating market in New York, and indicated to them just how they could profit by actively promoting this method of complete automatic heating.

N. T. Sellman, Assistant Vice-president, and Wm. De Frietas, Manager, Dealer Service Division, also spoke briefly.

J. A. Malone, Assistant General Sales Manager, outlined the new low house heating rates, and also explained the budget plan of paying the monthly gas bills.

In his special demonstration Mr. Lawder took a house which would burn in a season 10 tons of coal, or 1340 gallons of oil, or 277,000 cubic feet of gas. He pointed out that these figures were based on using conversion burners —and that the figures had been obtained from the United States Bureau of Standards.

The final figures on comparative "over-all" costs as worked out by the plumbers present were as follows:

Coal for heat and gas for other purposes	$230.06
Oil for heat and gas for other purposes	234.96
All gas	223.35

Indiana Gas Assn. Meeting May 20th & 21st

The Twenty-sixth Annual Convention of the Indiana Gas Association will be held at Purdue University on Wednesday and Thursday, May 20th and 21st. Papers of interest to gas men will be presented.

Production and Chemical Conference May 25 to 27th

The joint conference of the Production and Chemical Committees of the American Gas Association will be held May 25, 26 and 27 at the Hotel New Yorker, New York City. The program is as follows:

Monday, 10:00 A. M.

Opening Remarks, Louis Shnidman, Chairman, Chemical Committee, Rochester, N. Y.

Greetings, Alexander Forward, Managing Director American Gas Association.

Address, Herman Russell, President, Rochester Gas & Electric Corp., Rochester, N. Y.

Paper: "Review of Principles of Heat Transfer," C. C. Furnas, Yale University, New Haven, Conn.

Paper: "The Koppers Electrical Process for the Prevention of Nitrogenous Gum in Distributed Gas," W. L. Shively and E. V. Harlow, The Koppers Construction Co., Pittsburgh, Pa.

2:00 P. M.

Opening Remarks, A. E. Lockwood, Chairman, Gas Production Committee, New York, N. Y.

Paper: "Shrinkage of Low-Temperature Coke on Reheating to a Higher Temperature," J. D. Davis and H. S. Auvil, Bureau of Mines Experiment Station, Pittsburgh, Pa.

Paper: "Quantitative Analysis of Deposits in Manufactured Gas Distribution Systems," A. R. Bayer, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Paper: "Plant Experience in Practical Reduction of Gum Difficulties, Vapor or Liquid Phase," W. K. Beard, The Philadelphia Gas Works Co., Philadelphia, Pa.

Report: "Subcommittee on New Developments," Wilbert J. Huff, Chairman, The Johns Hopkins University, Baltimore, Md.

Tuesday, 10:00 A. M.

Report: Subcommittee on Water Gas, F. B. Parke, Chairman, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Address, "The Relation of the Oil Industry to the Gas Industry," R. G. Griswold, Cities Service Co., New York, N. Y.

Report, Subcommittee on Analysis and Tests, J. F. Anthes, Chairman, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Paper, "Corrosive Action of Salt Water When Used for Cooling," E. M. Bliss, Public Service Electric & Gas Co., Harrison, N. J.

Report, Subcommittee on Carbonization and Coke, C. R. Locke, Chairman, Chicago By-Product Coke Co., Chicago,

1:30 P. M. Round Table Luncheon Conferences

1. Water Gas Operation.
2. Gas Conditioning and Purification.
3. Plant Maintenance.
4. Coal Carbonization and By-Products.
5. Economics of the Gas Industry.

Wednesday, 10:00 A. M.

Paper, "A Study of the Removal of Free Sulphur from Spent Oxide," E. L. Sweeney and A. E. Sands, Boston Consolidated Gas Co., Everett, Mass.

Paper, "Some Methods Used in Evaluating Heavy Oils for Gas Making," (a) Relation of Oil Gravity to Over-All Efficiency when Using Heavy Oils. (b) Method of Determining the Gas and Tar Making Characteristics of Heavy Oils, H. G. Terzian, United Engineers & Constructors, Inc., Philadelphia, Pa.

Paper: "The Two-Stage Thylox Process for Complete Removal of Hydrogen Sulphide from Gas," A. R. Powell, The Koppers Construction Co., Pittsburgh, Pa.

2:00 P. M.

Paper, "The Effect of Breeze Admixture to Coal on Coke Strength," F. J. Pfluke, Rochester Gas & Electric Corp., Rochester, N. Y.

Paper, "The Safety Practice of Coke Plants," Charles Koons, Koppers Gas & Coke Co., Kearny, N. J.

Paper, "The Quantification of Dust in Gas Transmission Systems," I. H. Levin, Blaw-Knox Co., Pittsburgh, Pa.

Gas Meters Association of Florida and Georgia Formed

Representatives from Florida Public Service Company, Central Florida Gas Corporation, Florida Power and Light Company, St. Augustine Gas Company, Clearwater Gas Company, Ft. Myers Gas Company, Florida Public Utilities Company, Southern Gas and Electric Corporation, Jacksonville Gas Company, and Savannah, Georgia, Gas Company met in Clearwater, Florida, on April 14th and 15th and formed an Association to be known as "THE GAS METERS ASSOCIATION OF FLORIDA AND GEORGIA."

The following officers were elected, V. W. Kennedy, Florida Public Service Company, Orlando, President; J. W. Owens, Central Florida Gas Corporation, Winter Haven, Vice-President; and R. O. Berry, Jacksonville Gas Company, Secretary and Treasurer.

The purpose of the meeting was to formulate an organization of all the manufactured gas properties in Florida and South Georgia. It was decided that we would meet twice a year at some central location in Florida for a two-day meeting in order to exchange ideas and discuss problems on merchandising, distribution, and plant operation. It was thought that a great deal of good could be derived from these meetings inasmuch as our problems and conditions are very much the same. Each company will be assessed a fee of $5.00 in order to defray necessary expenses that might be incurred. It was also decided to invite all appliance manufacturers to participate in the meetings on the same basis as representatives of the companies. The first meeting will be held the early part of September.

The following representatives were in attendance: C. J. Noda, St. Augustine Gas Company; V. W. Kennedy, Florida Public Service Company; H. K. Burnett, Robert Jones, Ted Burgman, P. L. Ellis, C. R. Johnson, Florida Power and Light Company; J. W. Owens, Central Florida Gas Corporation; C. L. C. Kah, Florida Public Utilities; A. J. Lawlor, Southern Gas and Electric Corporation; Carlton Van Devort, Ft. Myers Gas Department; A. C. Nichols and G. G. Greer, Clearwater Gas Department; R. F. Daugherty, Savannah Gas Company, and R. O. Berry, Jacksonville Gas Company. The A-B Stove Company and Handley-Brown Water Heater Company were represented by Mr. W. O. Weeks and Mr. H. A. Sebald. Electrolux was represented by Mr. Chris Marsden.

Mystery Chef's Pulling Power

The pulling power of the Mystery Chef's broadcasts was strikingly emphasized in Rochester, New York, recently. The program there is sponsored by the Rochester Gas & Electric Corporation and is ordinarily presented by electrical transcription because Rochester is not on the WEAF network. A few weeks ago the Chef, on a motor tour, dropped off at Rochester and, visiting Station WHAM, was asked to give the broadcast in person.

His suggestion for that evening's dinner was strawberry shortcake, and his recipe and description were so alluring, that the wife of the Domestic Sales Manager, Frank Houston, of the R.G.&E. decided to serve it. Evidently a lot of other people had the same idea for Mrs. Houston visited six stores in her section of town and every one reported a complete sellout of strawberries. The rush began shortly after ten o'clock when the Chef finished his broadcast and until Mrs. Houston furnished the explanation, the delighted but puzzled grocers were trying to account for the sudden demand.

IMPROVED EQUIPMENT — RUSSELL ENGINEERING

Coal Gas Plants—Horizontal Ovens, Benches, Refills, Additions, Repairs, Charging and Discharging Machines

DIVISION OF
COMBUSTION UTILITIES CORPORATION
24 STATE STREET
NEW YORK

Oil Gas Plants—"Refractory Screen" Process for Base—Standby or Peak Loads—On Existing or New Water Gas Sets Low or High B.T.U. Gas

Obituary

Charles L. Krause

April 14, 1936 brought to a close the long career of Charles L. Krause, gas engineer, whose 52 years' service with the Union Gas and Electric Company, Cincinnati, O., won him public acclaim for faithful duty. He died at his home following a heart attack. He would have been 74 years old May 16.

Mr. Krause started with the gas company at the age of 21 years as a pipe fitter, at $12 a week.

His first duty with the firm—then the Cincinnati Gas Light and Coke Company—was to repair damage done by the raging waters of the record Ohio River flood of 1884.

CHARLES L. KRAUSE

Mr. Krause's first significant promotion with the company came in 1897, when he was placed in charge of the old Avondale Station. His chief difficulty at that time, he often related, was in getting lights turned on and off because, permitted to pay but $12.50 a month for tenders, he said, the only persons he could get for the job were "little boys and old men."

During Mr. Krause's time as gas engineer for the Union Gas and Electric Company, he designed many types of industrial gas burners, which were later adopted and patented by various manufacturers. In the early days of industrial gas equipment his services were requested by a number of gas companies in the United States, and he could be rightfully called a pioneer in the application of gas for industrial purposes. From 1906 to 1920 he was personally responsible for the design, sale and use of all industrial gas equipment in Greater Cincinnati.

A testimonial dinner was given in his honor at the Cincinnati Club March 1, 1934, in recognition of his 50 years' service with the company up to that time.

H. O. Caster, 64, Cities Service Executive

Herbert Oliver Caster, general counsel and director of oil and gas companies headed by Henry L. Doherty, president of Cities Service Company, died April 14th, at Polyclinic Hospital, New York, where he had been seriously ill for four weeks.

Mr. Caster was born August 28, 1871, in Meigs County, Ohio. He was educated at Oberlin High School and Ottawa University, both in Kansas. He was admitted to the bar in 1906.

After experience as counsel for the Kansas Utilities Commission and three years of general law practice in Topeka, Kan., he was appointed general counsel to the Empire Gas and Fuel Company, a Doherty subsidiary, with headquarters at Bartlesville, Okla. In 1925 he became an executive of Cities Service Company, of which he was associate head of the oil and gas division at the time of his death.

He was a former President of the American Gas Association.

J. H. White

Funeral services were held April 24 for J. H. White, 45, president of the Southern Natural Gas Company, Birmingham, Ala., and widely known Birmingham industrialist, who died at his home a short time after suffering a heart attack.

Mr. White has been president of the Southern Natural Gas Company, formerly known as the Southern Natural Gas Corporation, since its organization in 1929. In addition, he was formerly vice-president and general manager of the Semet-Solvay Company.

National Advertising Compaign Gets Under Way

Herman Russell, chairman of the Committee on National Advertising of the American Gas Association, announced on April 22 that McCann-Erickson, Inc., of New York, had been selected as the agency to handle the national advertising account of gas as a domestic fuel. Mr. Russell announced at the same time that Ketchum, MacLeod & Grove, Inc., Pittsburgh, Pa., present advertising counsel of the Advertising Committee of the Industrial Gas Section had been appointed to handle the commercial and industrial phases of the program.

Working with the agencies in formulating basic policies and a detailed plan of action will be a committee representing companies participating in the national advertising program. The first meeting of this committee has been called at Association Headquarters, New York, on April 29th.

New 15 Mile Pipe Line For Western Utility Company

Plans have just been completed for laying a new main trunk natural gas line from Carlsbad to Escondido, California. The line will be constructed by the owner, the San Diego Gas and Electric Company and will be completely Lindewelded.

The total length of this new line will be about fifteen miles. It will require 58,000 ft. of 2½-in. and 21,000 ft. of 3-in, standard pipe. The line will be designed to carry natural gas at a peak pressure of 400 lb. per sq. in. Work is to start May 15, 1936.

AGP Holds Sales Conference

The 1936 Sales Conference of the American Gas Products Corporation, New York, was held at the Empire Hotel, New York City, on April 3rd, 4th and 5th. There were 45 representatives in attendance at this conference. A number of new products, and a great many improvements on existing products were shown, and gone into very thoroughly.

One of the three days was spent entirely at the AGP Laboratories in New York City, and at that time some really wonderful advancements in the art of the utilization of gas were shown and demonstrated.

Sales representatives from all over the United States were in attendance.

Be wise;
use the oxide *that is becoming* standard *for the purification of gas,* i.e. GPM IRON HYDROXIDE
GAS PURIFYING MATERIALS CO. INC.
Long Island City, New York & Providence, Rhode Island
Confer with Our Specialists at the Production and Chemical Conference, *New York, May 25-27th.*

Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

Be Sure the Gas Appliances You Sponsor are Equipped with

BARBER

A.G.A. *Approved*

Gas Pressure Regulators

FOR your own protection, as well as the consumer's, every gas burning appliance you install requires a dependable Pressure Regulator—either as an accessory or on the supply line. This and only this assures constant pressure of fuel supply—with consequent safety of operation, and with proper economy, which reduces gas bill complaints and service calls.

On so vital a piece of equipment, why take chances? Barber Gas Pressure Regulators are listed in the A.G.A. Directory of Approved Appliances, thus complying with stringent requirements as to pressure drop and precision of operation. Compact design, all bronze bodies—a product of BARBER QUALITY down to the last detail. Very moderately priced for a Regulator of this quality.

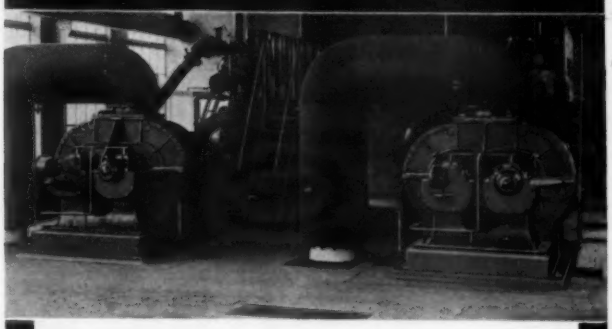
Write for complete literature, prices and discounts on the entire Barber line of Burners and Regulators.

THE BARBER GAS BURNER COMPANY

3704 Superior Ave. Cleveland, Ohio

"R-C" Boosters

WITH GAS ENGINE DRIVE



● Power economy, resulting from the adaptability of Roots-Connersville Rotary Positive Boosters for use with any economical source of power, is only one reason for the widespread application of this equipment throughout the Gas Industry.

No less important is the demonstrated ability of "R-C" Boosters to "stand up" under severe service year after year. ●

Roots CONNERSVILLE

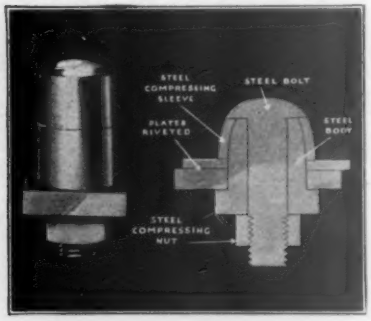
BLOWER CORP.

CONNERSVILLE, IND.

TOMORROW'S ENGINEERING APPROVED BY YESTERDAY'S EXPERIENCE ●

Mechanical Rivets

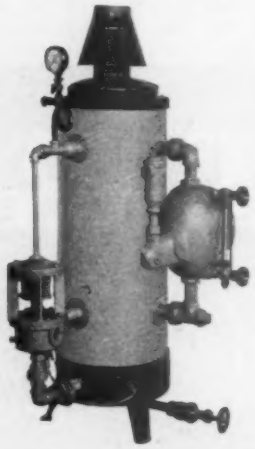
Multi-Seal Mfg. Co. 123 No. Jefferson St., Chicago, Ill., make mechanical rivets that are inserted and operated from only one side of the job with a wrench, giving the strength of an ordinary bolt or rivet. Riveting or bolting jobs that are not accessible from both sides can be rapidly and securely accomplished by inserting a Mechanical Rivet and turning the nut down, forming a steel rivet head on the inside.



The Mechanical Rivet is constructed of a one-piece steel body consisting of a heavy steel cylinder, machined and drilled, with a square head at one end and a taper valve seat at the other end. A steel expansion and compressing ferrule fits on the valve seat with a hardened steel bolt passing through the assembly, the head of which is under the expansion and compressing ferrule. When the nut is turned down, it draws the expansion ferrule up, expanding and compressing it tight against the parts being riveted.

A leaflet containing sizes and other information can be had by addressing the company.

INDUSTRIAL GAS BOILERS
Tubular or Flueless
¾ to 45 H.P.



P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

Welsbach Announces New Conversion Heater

Welsbach Company, Gloucester City, N. J., announces the development of the Welsbach Hotzone "Number Seven" Conversion Gas Water Heater. The purpose of this heater gives the public an opportunity to change their present tanks into automatic storage gas water heaters.

This heater utilizes a Welsbach luminous flame burner with a 100% Safety Gas Shut-off and has an input of 5000 B.T.U.'s per hour. This heater is also equipped with a Welsbach Thermostat which controls the temperature of the water in the tank.

It is of white baked enamel finish with bands and fittings of satin metal finish.

This heater is very compact—dimensions being as follows: W: 4¾"; D: 7¼"; H: 18½".

Change of Location of Chicago Office

The Chicago branch office of Roots-Connesville Blower Corp., Connersville, Ind., is now located at 140 So. Dearborn St., and is in charge of Wm. Townsend who has been connected with the company for 27 years, assisted by J. T. Sutliff, formerly located at the factory.

Cory Gas Coffee Brewers Have New Flame Control

Adjusting the gas supply of glass coffee brewers to get the desired high heat for brewing and low heat for holding coffee at serving temperature, has always been a matter of guess-work and considerable annoyance to the busy operator.

The new Cory Commercial Gas Ranges have **patented flame control.** The burners are adjusted at time of installation for correct high heat and correct low heat. Either is secured by a single turn of the handle, and the flame obtained is automatically right!

In the Cory Gas Range low heat is secured by turning the lever straight through "high" as far as it will go. That automatically gives the correct "low" flame.

The accompanying picture illustrates the idea of the three positions—off, high and low.

The Glass Coffee Brewer Corporation, makers of this improved restaurant coffee making equipment, recently moved to larger quarters at 325 North Wells Street, Chicago, Ill.

E. H. Adams With Merco Nordstrom Valve Co.

E. H. (Ernie) Adams, chemical engineer, well-known on the Pacific Coast, has become associated with Merco Nordstrom Valve Co. and Pittsburgh Equitable Meter Co. He will make his headquarters in the Los Angeles office of these concerns.

E. H. ADAMS

For many years Mr. Adams has been active in the natural gas industry and has been associated with various companies in charge of production. He is also well-known in oil, chemical and hydraulic circles.

In his new position, Mr. Adams will devote his time to sales and engineering work in the interest of Pittsburgh Meters, Nordstrom Valves and allied products. He will cover Southern California. H. Boezinger is manager of the Los Angeles office.

S. T. McKenzie With Dresser

S. T. McKenzie has joined the S. R. Dresser Mnfg. Co field sales organization. For a number of years he has called on all the important natural-gas utilities and oil refineries in all parts of the country east of the Rocky Mountains. This first-hand experience has given him a very practical familiarity with pipe-line problems of all kinds that in many cases is very helpful to those upon whom he calls. For the present his work will be confined largely to the New England states.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

IF YOU REQUIRE AN UNMIXED GAS PURIFYING MEDIUM...USE

LAVINO "ACTIVATED" OXIDE

WRITE FOR DETAILS. NO OBLIGATION.

Not merely a "satisfactory purifying medium," but a material made specifically for maximum H_2S removal . . . ready for mixing with an inert carrier.

E. J. LAVINO and COMPANY
1528 Walnut St.
Chicago Philadelphia, Pa. Pittsburgh

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

ANDALE COMPANY
1600 ARCH STREET
PHILADELPHIA

Ray Jerge With Pittsburgh Equitable Meter Co.

Ray Jerge, former industrial gas engineer for the Cities Service properties of western New York, has joined the sales force of the Pittsburgh Equitable Meter Company and its subsidiary, the Merco Nordstrom Valve Company.

RAY JERGE

Mr. Jerge was educated in the schools of Buffalo and at Columbia University. He has been with Cities Service for the past nine years as new business manager and in the past three years in charge of industrial engineering. In his new position Mr. Jerge will operate from the Buffalo office under the supervision of district manager, C. F. Thomas.

R. A. Lawder Promoted

Robert A. Lawder, who has been assistant manager of the House Heating and Air-conditioning Division of the Consolidated Edison Company of New York, was promoted on April 2 to Sales Promotion Manager, a newly created position, according to an announcement by George Ostlund, General Sales Manager.

Mr. Lawder has been connected with the Sales Department since he joined the company in 1931 as a salesman in the House Heating Division. He was transferred to the East River Gas Company in 1932 as sales supervisor, and in January, 1933, he became a Retail District Supervisor. In July, 1935, when the house heating and air-conditioning activities were combined, Mr. Lawder became assistant manager of that division.

F. A. Wegener V. Pres. Welsbach Co.

At a meeting of the Board of Directors of Welsbach Company held on March 23, 1936, F. A. Wegener was elected vice-president of the company.

Mr. Wegener was graduated by Columbia University in 1912 as a mechanical engineer. Shortly after graduation he became associated with the Welsbach Company and has served as assistant master mechanic, works engineer, chief engineer and general manager. In July, 1934, he was elected to the Board of Directors.

New Surface Combustion Corp. Sales Portfolio

Surface Combustion Corp., Toledo, O., have issued a sales portfolio which they state is "To Support Your Sales Activities." It contains a number of pieces of printed matter, printed in colors for the salesmen and to mail to house heating prospects. It tells how the material may be used to promote the sale of gas heat. The company manufactures the Connerton Gas Burner called Janitiol. Copy of portfolio may be had by addressing the company.

CONVENTION CALENDAR

May

20-21 Indiana Gas Association, annual convention, Purdue University, West Lafayette, Ind. P. A. McLeod, secy.-treas.

21-23 American Gas Association, Metropolitan Regional Gas Sales Conference, Lake Mohonk Mountain House, Lake Mohonk, N. Y. J. W. West, Jr., secy., 420 Lexington Ave., New York, N. Y.

25-26 American Gas Association Industrial Gas Section, Commercial Gas and Hotel and Restaurant Sales Symposium, The Mayflower, Washington, D. C.

25-27 American Gas Association annual joint conference of the Production and Chemical Committees, Hotel New Yorker, New York, N. Y.

July

6-8 Michigan Gas Association, annual joint convention with Michigan Electric Light Association, Grand Hotel, Mackinac Island, Mich. A. G. Schroeder, secy.-treas., 47 No. Division Ave., Grand Rapids.

8-10 29th Annual Meeting Canadian Gas Association and Northwest Conference Pacific Coast Gas Association, Hotel Vancouver, Vancouver, B. C., Canada.

August

25-27 Pacific Coast Gas Association, 43rd annual convention, Fairmont Hotel, San Francisco, Calif. Clifford Johnston, managing director, 447 Sutter St., San Francisco.

October

Week of October 26th American Gas Association, 18th annual convention, Atlanttic City, N. J.

THE STACEY BROS. "BULLET"

A SUPERIOR HIGH PRESSURE HOLDER

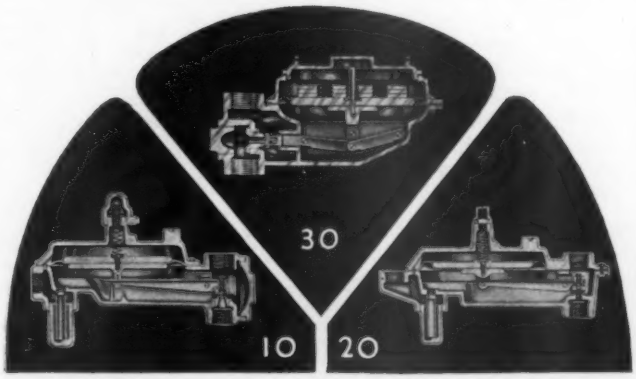
Permanent tightness is assured in Stacey Bros. "Bullets" as design allowance is made for expansion and contraction without causing leakage. Our creative design of roller bearing mountings and interior spider construction has proven its value over a long period of time and under all kinds of climatic conditions.

The Stacey Bros. "Bullets" remain tight at all pressures and capacities. They are designed in either the vertical or horizontal type.

STACEY BROTHERS

CINCINNATI GAS CONSTRUCTION CO. OHIO

SERVICE!



☆ ☆ ☆ **Reynolds Service Regulators Models 10, 20 and 30.**

Reynolds service regulators, Models 10, 20 and 30, are built to meet specific requirements—years of operation in the field through a complete range of operating conditions have proved their superiority.

With parts so precisely machined for each model that they are completely interchangeable on one or one hundred Reynolds regulators—the accuracy you demand in performance is assured.

Reynolds engineers gladly co-operate with you in working out gas problems. Write for details.

☆

MODEL 10—Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal. All working parts are so accessible as to be interchangeable without removal from pipe line.

MODEL 20—Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal. All working parts are so accurate as to permit complete interchangeability in shop.

MODEL 30—For horizontal or vertical connections, with or without removable valve pocket. Available with either Spring or Dead Weight adjustment. With or without Mercury or Dead Weight Safety Seal.

Reynolds Branch Offices:

421 Dwight Bldg.
Kansas City, Mo.
2nd Unit, Santa Fe Bldg.
Dallas, Texas

Representatives:

Eastern Appliance Co.
Boston, Mass.
F. E. Newberry
Avon, New Jersey

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

TECHNICAL CECO PAINTS

GAS HOLDER and PLANT PAINTS

CECO Paints have behind them the solid experience of more than 50 years specializing on paints for gas companies, reinforced by latest technical research and refinements.

Your inquiry will have *expert attention by men who know the gas man's paint problems.*

CHEESMAN-ELLIOT CO., INC.
Technical Paint Makers—Established 1876
647 Kent Ave. Brooklyn, N. Y.

"CHACE BIMETAL used in THE PILOT SHUT-OFF of AGP DICTATOR WATER HEATERS 15 20 30 40"

AMERICAN GAS PRODUCTS CORPORATION
Division of
AMERICAN RADIATOR COMPANY

Chace Thermostatic Bimetal fabricated in various types and to meet working temperature requirements as high as 1200° F. A most dependable agent where change in temperature demands unfailing automatic movement or where temperature must be held at a predetermined level. Each shipment made to meet some specific specification. Sheets, strips or in finished forms.

W. M. CHACE CO.
1610 Beard Avenue - - - Detroit Mich.

Over 32,000 Came—Guessed and Went Away Talking Gas Refrigeration

(Continued from page 42)

were turned in during the five weeks. Of this number 25,323 people (79 per cent) guessed too much gas. The eight refrigerators averaged a consumption of 1,089 cubic feet for the five week period, or 31 cubic feet a day. At local gas rates, some of the refrigerators operated for as little as 1.6 cents a day. Using gas selling at 75 cents per 1,000 cubic feet, they averaged 2.3 cents operating cost per day.

At the close of the contest local papers ran news stories telling of the outcome and announcing the winners. Interest was increased by the fact that nearly every contest ended in a tie. In one city eight people tied. To break these ties, the refrigerators were placed under test for 48 hours, with doors closed, and the tying contestants guessed again.

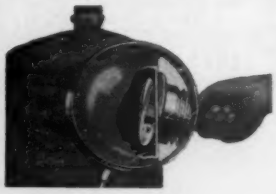
The results of the contest were consolidated into another newspaper advertisement which was released in some 35 cities several weeks following the close of the tests. The company's monthly customer publication, "The Gas-ette," which goes to all customers, also carried a photograph and feature story of the results.

Electrolux sales for the first several weeks of this year's campaign, which has been advanced by one month, have increased substantially over the early part of the 1935 drive. Any number of sales already have resulted directly from the contests. The salesmen have thousands of live prospects on which to work without spending one hour of their time in canvassing efforts.

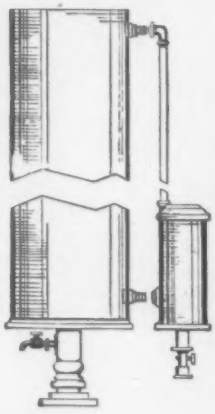
As a promoter of interest, as a creator of good gas refrigerator prospects and as an effective method of publicizing the low operating cost of gas refrigerators, The Ohio Fuel Gas Company considers this expenditure one of its best investments in advertising and sales promotion.

TORIT QUICK-ACTION COUPLINGS

For connecting gas heaters to range boilers.



See how easily the coupling slips into the hole in tank.



Installing gas heaters is quickly done with

TORIT

Quick-Action Couplings

Merely drill holes in tank, slip in the couplings, make tight—and the job is done.

Cut installation expense in half — with greater efficiency!

Ask us for full information.

Torit Manufacturing Co.

St. Paul, Minn.

JOHNSON No. 108 BENCH FURNACE

A big market exists for this popular furnace. Used extensively by machinists, battery men, auto mechanics, sheet metal workers, and plumbers. Heats largest soldering coppers and heat-treats, tempers, anneals, and case-hardens carbon steel tools and parts. Embodies exclusive Johnson patented features. Write for free catalog.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Western Representative:
C. B. BABCOCK CO.
135 Bluxome Street
San Francisco, Calif.

Eastern Representative:
J. H. McPHERSON
230 Stuart Street
Boston, Mass.

GAS SERVICE STOPS

SINCE 1869 Hays has built dependable brass products for the Gas Industry. Standard, Special Weight, Heavy Pattern and High Pressure Stops to meet all requirements are manufactured by Hays in a full range of sizes. Write for Catalog No. 4 today.

HAYS MANUFACTURING CO. ERIE, PA.

THE GOODMAN STOPPER

The Reliable Shut-Off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

Effective for Every STEAM-REDUCING PURPOSE

Whatever steam-reduction you require, there is a C-F Regulator of the Lever and Weight type to accomplish it. The regulator here shown is for low-pressure heating systems where initial pressures as high as 200 pounds must be reduced to delivery pressures of 5 to 10 pounds. Sizes of 1 to 2 inches can be provided with outlets of greater diameter.

Chaplin-Fulton Regulators have been used and approved for fifty years. Advice as to type and specification for any particular requirement will be gladly given.

THE CHAPLIN-FULTON MFG. CO.
28-40 Penn Ave. Pittsburgh, Pa.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR
ALL MAKES — ALL SIZES OF METERS

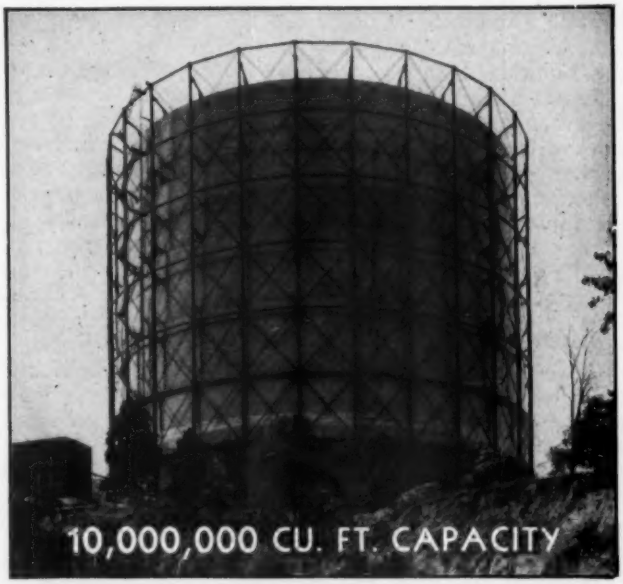
LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— 0 —

LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.



HIGH PRESSURE **GAS HOLDERS** LOW PRESSURE

PURIFIERS · TANKS · CONDENSERS
STEEL PLATE CONSTRUCTION

INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.
AMBLER, PA.

DOMESTIC GAS UTILIZATION

(Continued from page 17)

catching or hooking cleaning rags. Some racks are so equipped that in removing, the same does not pull all the way out accidently but has an accident preventing stop.

Pan Placement

The exercise of common sense in placing pans or utensils on oven racks will be productive of better baking results and also a reduced gas consumption for any given baking operation. Remember that in the gas oven, heat is transferred by circulation. When two racks are used pans should be placed in a staggered fashion in so far as possible, that is, so that pans are not directly one over the other. Such placement will interpose in the path of heat circulation the greatest resistance thus preventing one pan robbing heat from another and insuring the use of the greatest possible available heat.[7] When a single pan is used the same should be placed near to the top (oven Types I, III, and IV) and close to the vent, thus benefiting from the heat rising from the bottom or emerging from the side walls. Utensils should be placed at least 1" from the oven walls thus permitting heat to escape unretarded from the side flues and also preventing scorching the near edge.

Smart household economists—this is synonymous with the modern housewife endeavoring to economize on her gas bill—so plans her meals as to be able to cram the oven up to maximum capacity. The difference in gas consumption occasioned by doubling the food or oven load is negligible (of the order of only 24%). Tests indicate that four cakes require only 71% more Btu. than one cake—in other words, four times as much oven food has less than double the gas usage.[8] The principal heat required in oven cookery is the heating up period and the escapement from the flue and walls, all of which is independent of the heat absorption in the food. The addition in the oven of vegetables and potatoes to a meat course requires only 10% more gas than cooking the meat by itself. And so it goes—when the oven is to be employed at all in the preparation of a meal, shove as much as possible in.

(Part II continued next month)

[7] *On Page 15 of "What's Within the Gas-Range," published by the American Gas Association appears a statement to the effect that when baking four layer cakes, two on each rack, in staggered or alternating positions, 6,700 Btu. were used whereas baking the same cakes when placement was made one over the other, gas consumption was 7,200 Btu. or 7.5% greater.*

[8] *Reported in "Household Equipment" by Peet and Sater.*

USE OF COPPER PIPE ETC.

(Continued from page 30)

mains and as suction lines out of drip pots. No attempt has been made to use copper pipe for new or replacement services.

1. COMMENTS FROM PROPERTIES AT PRESENT NOT USING COPPER PIPE

One property offers the following objections to the use of copper pipe for services:

(a) Use of a sweated joint.
(b) Possibility of breaking the copper service pipe attempting to operate a curb cock which is stuck from many years of inoperation.
(c) Inability to provide a substantial connection inside the basement wall, particularly in cases where a header for a number of meters is necessary.

Another property has the following comments on the use of copper pipe:

"My own reaction would be against the use of copper pipe, since my observation indicates that the deterioration of service pipe is largely due to electrolytic conditions—both that brought about by stray current and by local galvanic action induced by differences in soil or chargeable to proximity of another metallic conduit which may act as one pole of a cell. As you know, the unit loss of copper is greater than that of iron when electrolytic energy is the cause of the deterioration. This fact, plus the generally thinner walls of copper pipe as compared with iron, would force one to the conclusion that insofar as these factors are concerned, iron is preferable to copper."

OBSERVATIONS ON METER PRACTICES

(Continued from page 26)

that is adaptable to the small shop using this type of meter. In regards to other methods for Sprague meter overhaul, the Pacific Gas and Electric Company utilizes a shaped iron to insure correct diaphragm alignment at the throat. The Los Angeles Gas and Electric Corporation has proved the use of No. 1201 Glyptal Protective Lacquer, a General Electric product, as a substitute for gasket material under a metal-to-metal valve.

In the Washington, D. C., shop diaphragms are oiled by removing the back plates and inserting the oil through the ports. The cases may be on or off. New Orleans has made a complete study of meter paint and procedure. Philadelphia reinforces the tube screws with a special cast bronze ring. This ring takes only a few minutes to install, and does the job with no chance of failure. A bubble testing machine for high-pressure and large size tin meters is used by the San Diego Consolidated Gas and Electric Company, which eliminates the necessity for submerging the meter in a tank of water. This Company also has a unique machine for simulating a 4-point test on Sprague meters. This equipment is used also to see that the check and open flows are within three percent (3%) of being together before the repaired meter enters the prover room. Philadelphia, Providence and Brooklyn have slow light testing racks that are very convenient in arrangement. For general shop layout, Boston offers one of the best places to study heating, ventilation and flow design. Mobile, Alabama, had a home-made automatic district governor loader that was simple but served its intended purpose. This Company uses a built-in manifold on its prover, with variable orifice sizes controlling flow at the outlet of the meter, that had permanent connections to a vent. Gas could be used without danger of polluting the room atmosphere. Providence, Rhode Island, has a deodorizer on the outlet of its ventilating system that removes traces of shop odors before discharging them into the out of doors. New York and Chicago use a portable meter cart within their shops, which has been adopted quite extensively by other companies. The Providence, Rhode Island, bench furnace for soldering coppers received good endorsement wherever one was installed; quick, cool, and economical operation are its merits.

This trip was a great education to me. This article does not do justice because the field I covered is too large and is highly controversial. I have told only the physical things I observed. The acquaintances I made are fully as important to me as the things I saw, and I regret that I am unable to adequately convey in words my appreciation for their cooperation in seeing that my trip was such a pleasant and instructive one.

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INDEX TO ADVERTISERS

Alpha Lux Co. 10
American Gas Products Corp. 43
American Meter Co. ..... —
American Stove Co. ..... —
Andale Company 49

Barber Gas Burner Co., The 47
Bartlett Hayward Co. 3

Cast Iron Pipe Research Ass'n. 6
Chace Co., W. M. 51
Chaplin-Fulton Mfg. Co. 53
Cheesman-Elliot Co., Inc. 51
Combustion Utilities Corp. 45
Connelly Iron Sponge & Governor Co. 55
Cooper-Bessemer Corp., The ..... —
Cruse Kemper Co. 53

Dresser Mfg. Co., S. R. 37

Electrolux Refrigerator Sales Inc. 8-9

Gas Purifying Materials Co. 46

Handley Brown Heater Co. 41
Hays Mfg. Co. 53

Improved Equipment-Russell Engr. Div. 45
Isbell-Porter Co. 56

Johnson Gas Appliance Co. 52

Kitson Co. 55

Lambert Meter Co. 53
Lattner Mfg. Co., P. M. 48
Lavino & Co., E. J. 49

Minneapolis-Honeywell Regulator Co .... Back Cover
Merco Nordstrom Valve Co. 31-32
Mohawk Asphalt Heater Co. ..... —

National Tube Co. 4-5

Alfred I. Phillips 55
Pittsburgh Coal Co. ..... —
Pittsburgh Equitable Meter Co. ..Inside Front Cover

Reply O. Inc. ..... —
Reynolds Gas Regulator Co. 51
Robertshaw Thermostat Co. ..... —
Roots-Connersville Blower Corp. 47
Ruud Manufacturing Co. 7

Safety Gas Main Stopper Co. 53
Semet Solvay Engineering Corp. 12
Sprague Meter Co. .....Front Cover
Stacey Bros. Gas Construction Co. 50
Superior Meter Co. 49

The Titan Valve & Mfg. Co. 55
Torit Manufacturing Co. 52

United Engineering and Constructors Inc. ..... —
U. S. Steel Corp. ..... —

West Gas Improvement Co. ..... —

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LUBRICATING PLUG VALVES

(Continued from page 20)

very essential that the gas be shut off positively when the valve is in its closed position; this is particularly true in emergency work. In the lubricated plug valve this position shut off is obtained quickly and easily. Dirt, which in ordinary valves is always a menace and often times prevents complete closing, cannot get to any of the important points of the lubricated plug cock. When the lubricated plug cock is called upon to seal off entirely, this sealing is effected by surfaces which, during the ordinary operation of the valve, have been very carefully protected against dust or wear by a lubricant seal. This simple easy one-quarter turn of the shank presents a surface to effect the sealing as carefully protected and clean as it was when the valve was new. The erosion and corrosion of the flowing gases which raise havoc with the sealing parts of the normal valve structure, are prevented from doing damage in the lubricated plug valve design.

When, due to emergencies or other conditions, it is necessary to operate a valve, the assurance that it will turn quickly and easily is very important. If it does not turn readily, much important time is lost, and expensive repairs must be made to put the valve in an operable condition. The lubricated plug valve, due to its continually lubricated condition, is kept in working condition at all times. If any tendency to stick is present, a few turns of the lubricant screw requiring but a few seconds will force the lubricant to the points where needed and by hydraulic jacking action relieve any tendency to stick.

The lubricant can be renewed by merely screwing out the lubricant screw, (check valves prevent the blowing out of the lubricant during this operation) placing a lubricant stick in the threaded hole and replacing the screw. Thus the valve can be made ready to operate again by turning down on the screw.

In the handling of liquids and gases more corrosive than those met with in normal gas distribution, the advantages of the lubricated plug cock are even more apparent. In certain industries the lubricated plug cock is the only valve used which can be relied upon to perform satisfactorily. In refineries it has made possible certain operations and controls previously desirable but impossible because of difficulty in handling the fluids.

As is the case with many mechanical developments, the qualities which must be evolved to meet the real difficult applications can be effectively applied to the less difficult installations, and a general improvement in performance results. Thus the effort expended to solve the very annoying valve problem presented in certain mining operations has resulted in a distinct and important valve improvement which is now finding ready acceptance in all industries. Freedom from sticking, elimination of leaks, positive shut off and easy and rapid operation are qualities which are valued wherever a liquid or gas must be controlled. Appreciation of this fact by all industries has increased the manufacture of lubricated plug valves to a point where they are produced in very large quantities and at a lowered cost. They are now taking their place along with other staple articles used in piping systems. In reality—"the perfect application of a principle" has provided a very useful and efficient tool in all places where fluid flow of any kind is to be controlled.

GUM FORMING HYDROCARBON

(Continued from page 22)

as preventing the production of gum forming hydrocarbons in gas making. In other words, the gas industry has a distinct advantage over the oil industry in that its marketable product can be produced free of gum forming hydrocarbons, which means liquids generally, and the cost of producing such a gas will be less than the present cost of enrichment merely because under properly controlled conditions gas of an exceptionally high quality can be produced with yields of from 115,000 to 130,000 B.T.U. per gallon of Bunker C fuel oil at a total production cost of approximately 3c per therm, assuming the oil to be worth 3c per gallon delivered.

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(To be continued)

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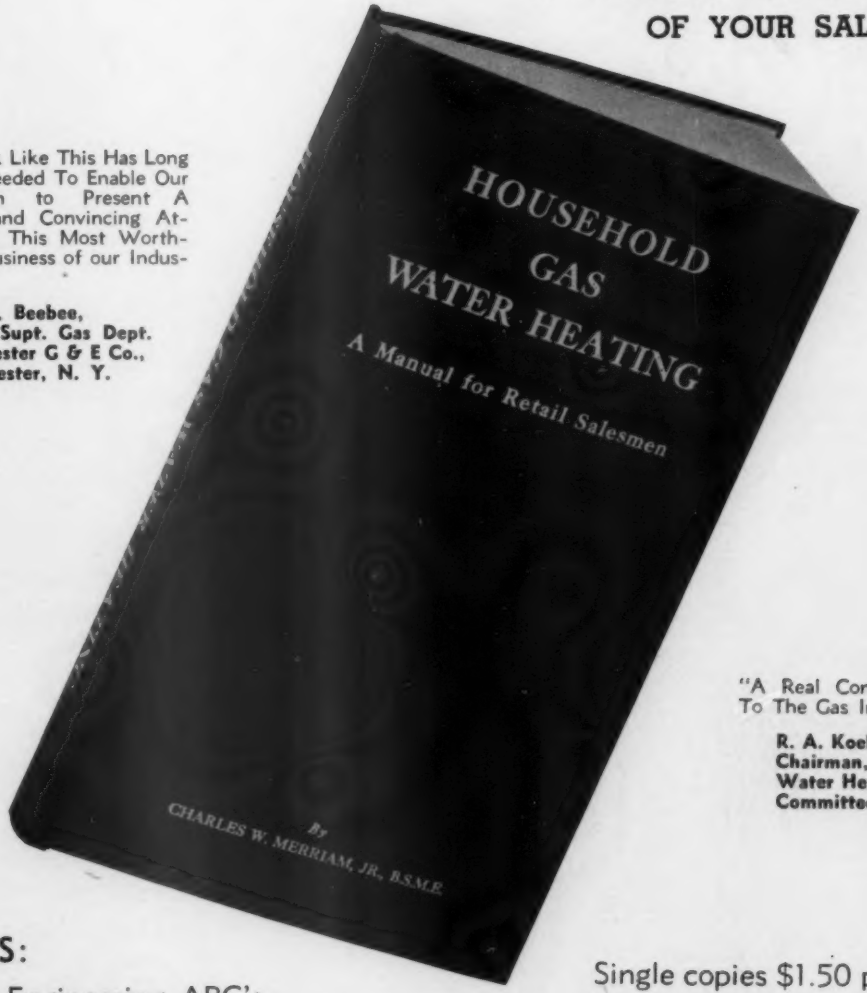

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CONTENTS:

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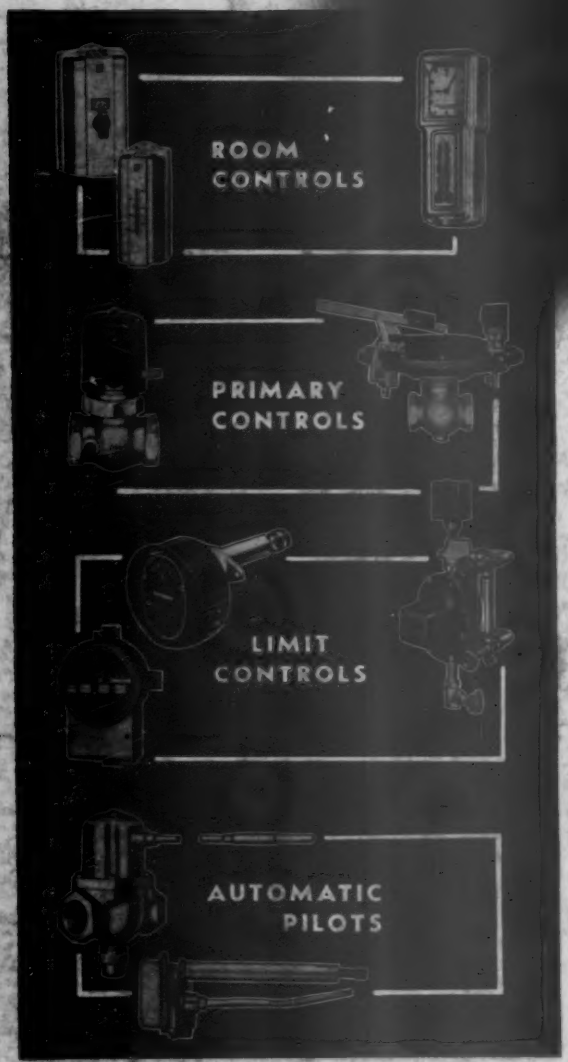

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